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Indexed in the Industrial Arts Index. Published every Thursday. Subscription Price North America, South America and U. S. Possessions, $8; Foreign, $15 a year. Single Copy, 35 cents.

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Cable Address, "Ironage" N. Y.

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This Week in The IRON AGE

Vol. 155, No. 3 — January 18, 1945

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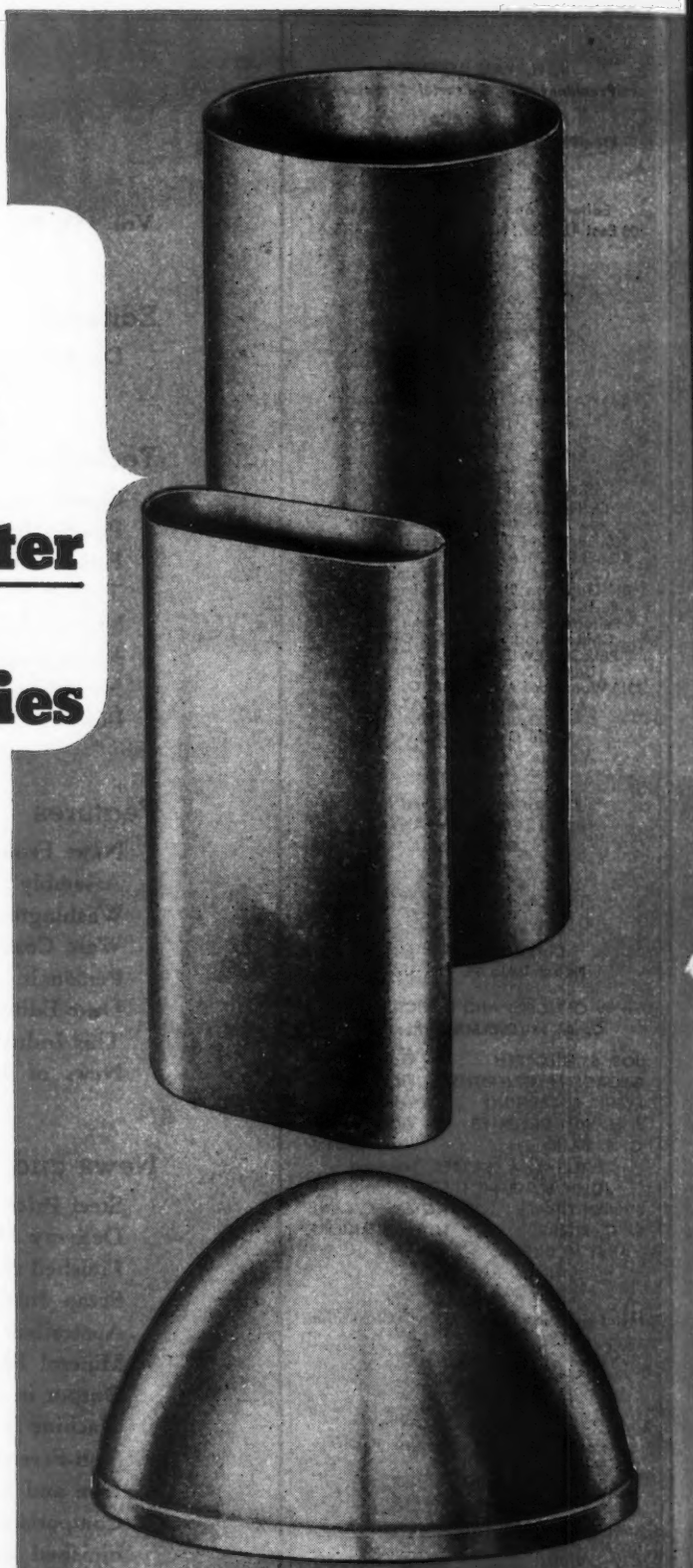
Deep-Drawn Shapes

can be drawn better on *Firthaloy* dies

(THE STANDARD CARBIDE)



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Do You Know What Work Means?

DO YOU know the meaning of work? It seems a strange question to ask of people who read this publication, which is devoted entirely to that subject!

I thought I knew what it meant, having lived with it for some forty years. But I have become disillusioned by looking it up in the dictionary.

Work, according to that supreme court of syllables, has more than fifty meanings. They range from "to create" to "causing liquors to ferment."

Evidently the seeker after work, if he confines himself to the dictionary, has plenty of choice.

I found also that over the centuries, starting with Adam, man's attitude toward work has undergone considerable change. The original conception of it, following the expulsion from the laborless Garden of Eden, was as a punishment for sin. Our fathers and grandfathers regarded it as a duty and privilege to be earned by the willing and conscientious expenditure of effort. Many of this generation regarded it as a right, leading to a meal ticket and one that conveys no obligations upon the recipient.

Sometimes I wonder where work stops and play begins, especially after watching a hockey game. I saw one the other night between the teams of two noted universities. I could not help thinking that if workers in industry had to undergo the punishment of banging their heads on barriers, taking dangerous falls every few minutes and having their shins cracked repeatedly, there would certainly be a strike, pronto!

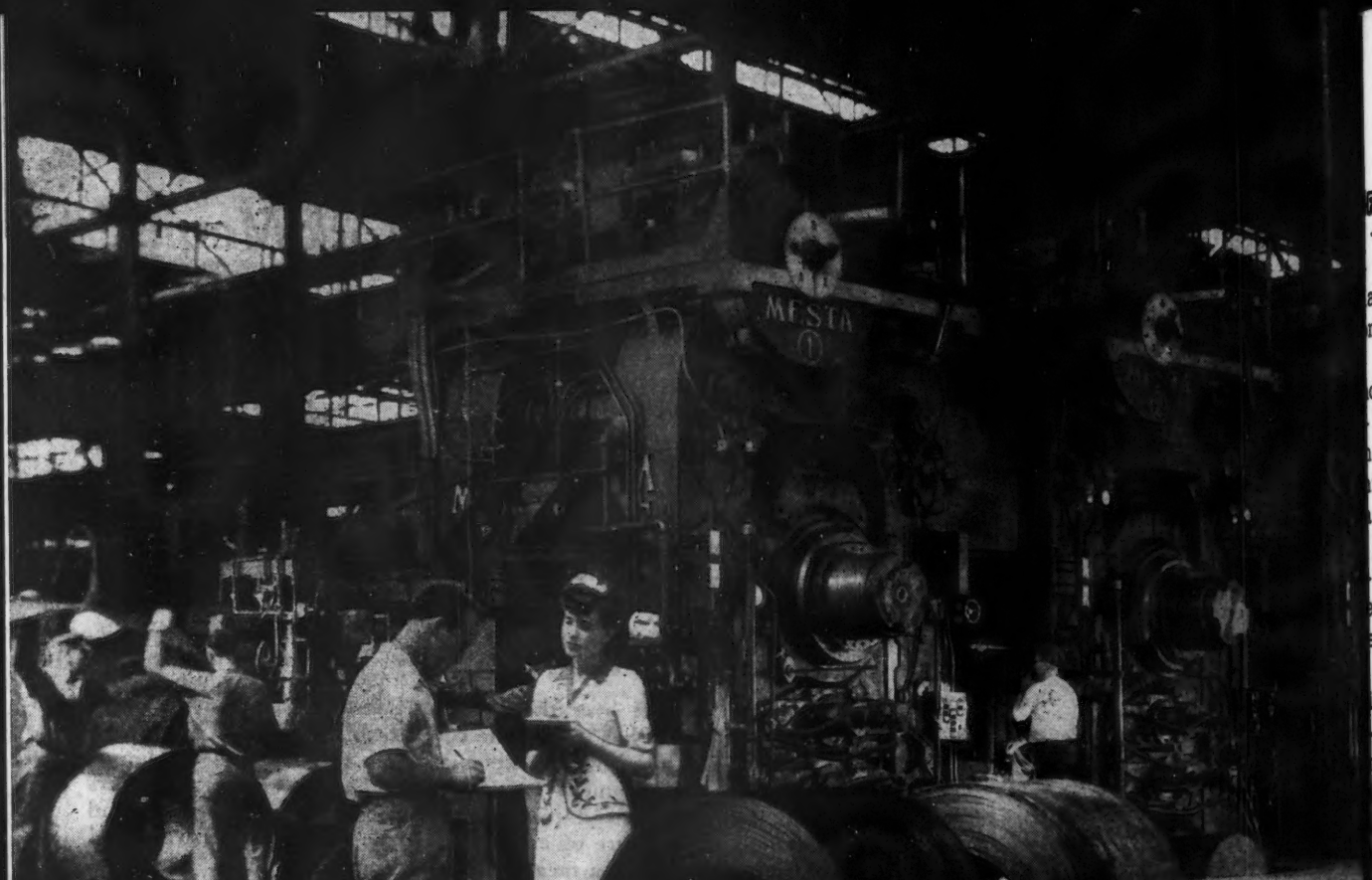
Perhaps the answer is that the difference between work and play is that the latter is work that does not have to be done and that is not paid for.

Now that we are talking about maintaining sixty million jobs in this country, we perhaps should know more about not only what work is but what it does. From this angle I like the one of the fifty meanings in the dictionary which says it is "to create."

That does not mean just to create employment. To make a job just for the sake of making it without regard to the values it produces is a social liability and not an asset. Jobs, to have social value, whether made to order or ready made, should be such as to produce economic values.

Private industry needs no urging on this point, because its jobs must of necessity be self-liquidating to keep the employer out of liquidation. But government made jobs are not under that compulsion since the burden falls on the taxpayer.

Government can best create jobs with social value by helping private industry to make them, rather than by attempting to compete with it, as a red ink employer.



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NEWS FRONT

The IRON AGE
January 16, 1945

Recent Russian technical data disclose for the first time a semi-commercial ant producing ferrovanadium from asphalt derived from Ural crudes. Vanadium ntent runs as high as 43 per cent of the ash.

California and Oklahoma crudes contain considerable percentages of vanadium, d at least one U. S. company may experiment with the same process.

Spalling of metal of the outer railroad rail on curves has been experienced greater degree by some of the heavy traffic Eastern railroads. To overcome is one of the rail makers has rolled a 3 per cent chromium rail which is air rdening and has a much higher Brinell hardness than a standard rail.

And: This rail is now undergoing field tests.

Cancelling draft deferments of one out of three men in the 26 to 29 group eeded by industry will cause a 15 per cent loss in war production, a WPB study eveals.

Plans are being formulated to lessen this withdrawal so that the new produc- ion schedules can be met.

Cadmium is in increasingly tight supply, with 1945 requirements up 5 per cent d production down 10 per cent from last year. Government stockpiles of cadmium so were reduced about one-third during 1944.

The RFC, through the Metals Reserve Co., has spent about $2,000,000,000 for e purchase of strategic and critical minerals. Because a great many of the terials have been bought at more than ceiling prices, losses through sales thin OPA levels have been $26,500,000.

U. S. Engineers has placed an order for 4000 aluminum half-pontoons with regon Shipbuilding Corp. at Portland. Maritime Commission has authorized this rd to divert 3000 workers for this new enterprise.

It is believed by many on the Pacific Coast that manpower problems there would t be very serious if workers were honestly and efficiently utilized, if there s a little less poker playing by some private managements, and less fumbling by ost public agencies responsible for the freezing, unfreezing, allocation, re- erral, and manipulation of manpower.

The lawsuit of the Government vs. Cold Metal Process Co., Youngstown, on basic tents covering the cold rolling of steel, closed last Thursday in Cleveland fter five weeks of hearings.

An interesting angle in these hearings was that for the first time X-ray dif- raction patterns were accepted as legal evidence to disprove Cold Metal's claim hat by Steckel rolling random grain orientation in rolled steel is obtained.

Best non-legal opinion in Cleveland is that Cold Metal has lost the case.

Disputing much recent publicity, the General Motors director of new devices, aid last week that there would not be swing from SAE steel specifications to the ar-developed AMS specifications.

Furthermore: He expected an early revision of SAE specifications on many teels to accommodate the growing acceptance of leaner alloys, but he expected NE rades of steel to disappear early in the postwar period in favor of the usual old AE specifications which prevailed in the days of freer ferroalloys.

A high strength bonding agent for metals and non-metals that can be cured nder low pressure in inexpensive jigs has been developed by Consolidated Vultee. he agent combines two adhesives, one having a synthetic rubber base and the other plastic base.

Drill breakage has been reduced by a new fixture, a torque coupling which dis- ngages the drill at a predetermined point in foot-pounds, then reassumes the load hen the driving torque returns to normal.

An incipient row is brewing between the AFL Detroit Building Trades Council nd the CIO Maintenance and Powerhouse Council. The AFL has refused to work in ny plant unless they can obtain an iron-clad agreement that they will not have to ork with any CIO members. So far two minor strikes have resulted. More are xpected.

Coated Abrasives

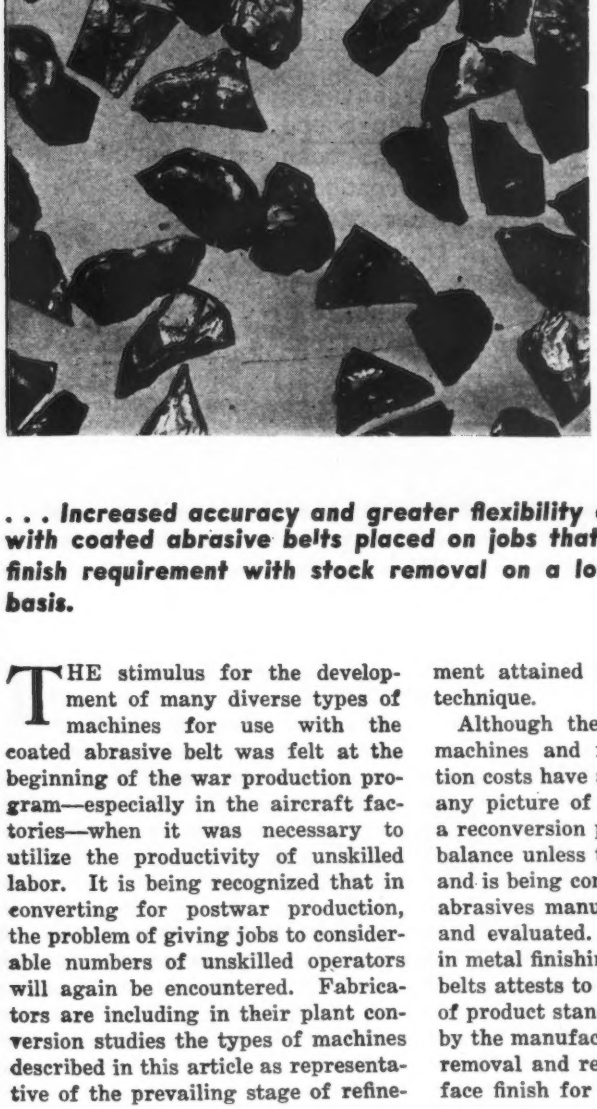


FIG. 1 — Photomicrograph of silicon carbide grains showing typical fracture into long sharp crystals limiting its usefulness on steel but ideal for soft metals. Aluminum oxide grains, on the other hand, have a massive appearance. Both are made at high temperatures in the electric furnace.

By J. ALBIN

. . . Increased accuracy and greater flexibility are being attained with coated abrasive belts placed on jobs that impose a surface finish requirement with stock removal on a low production cost basis.

THE stimulus for the development of many diverse types of machines for use with the coated abrasive belt was felt at the beginning of the war production program—especially in the aircraft factories—when it was necessary to utilize the productivity of unskilled labor. It is being recognized that in converting for postwar production, the problem of giving jobs to considerable numbers of unskilled operators will again be encountered. Fabricators are including in their plant conversion studies the types of machines described in this article as representative of the prevailing stage of refinement attained in the belt surfacing technique.

Although the capabilities of these machines and resulting low production costs have aroused much interest, any picture of the belt technique in a reconversion program will be out of balance unless the part that has been and is being contributed by the coated abrasives manufacturers is discerned and evaluated. The high uniformity in metal finishing with coated abrasive belts attests to the success of a policy of product standardization carried out by the manufacturers. Rates of stock removal and resultant quality of surface finish for any grit number have passed beyond the trial and error stage, as far as the user is concerned.

A trip through the plant of a coated abrasives manufacturer is very convincing on the critical matter of abrasive grain uniformity for any specific grit number. [The grit number is the number of openings per linear inch in the screen used to select abrasive grains of a certain size.] The laboratory staff needs to keep constant check on the grain sizes in order that the proportions of coarse and fines be kept within permissible limits established by the trade. By increasing slightly the proportion of coarse grains for a given grit number it is possible to gain faster cutting, but the quality of surface finish is left uncertain.

The modern scientific methods of grading the abrasive grains is responsible for the production of belts giving faster cutting, smoother finishes over a wide-range of grits and reduction in the percentage of material rejected because of wild scratches or other surfacing imperfections.

Machine tool designers realized that in the coated abrasive belt they had a cutting tool consisting of millions of

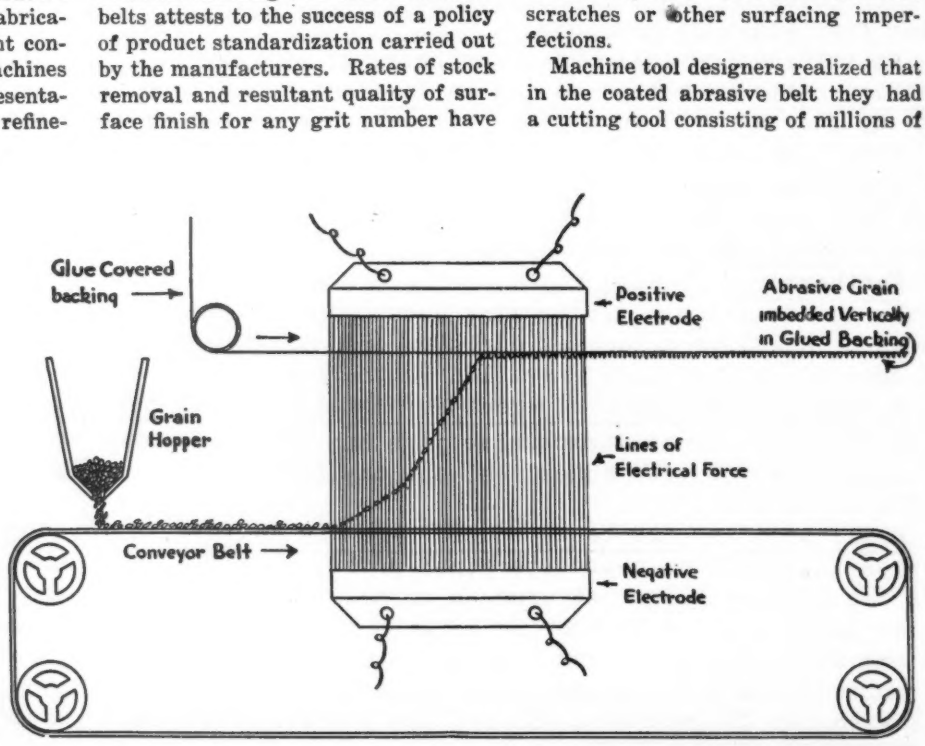


FIG. 3—Diagram of the Electro coating method for attaching abrasive grains to the backing. Grains compelled to follow lines of force become anchored in the bond with their long axes at right angles to the backing and evenly spaced.

For Production Surface Finishing

FIG. 2 — Photomicrograph of steel shavings cut by aluminum oxide indicating how the abrasive grains actually cut like tiny chisels rather than rub the material away.

cutting edges traveling rapidly over the entire surface of the work at the same speed, thereby imparting a uniform finish. Very few cutting tools are as hard or tough as aluminum oxide grains used on belts for surfacing steel, or as sharp as silicon carbide grains which are more satisfactory for the soft metals, plastics, glass, etc. Another characteristic of these grains is that they refracture in the course of being dulled by usage, presenting new sharp cutting points, Fig. 1. Each grain of abrasive on the belt performs like a cutter or tool, each removes chips that resemble the chips from a lathe, shaper tool or milling cutter—as illustrated in the enlargement, Fig. 2.

Another factor which contributes to the efficiency of the belt is the greater cutting area over that of other abrasive methods. The belts average in length 12 ft. for most of the equipment described in this article. Belts run cooler, hence work hardening of the part is under control. They can handle any type of outside grinding and finishing from deburring to grinding down welds. The cutting efficiency of the grit is further increased as the grain and material being worked are kept cool by water or other coolants.

One of the advantages of the belt over solid types of grinding mediums is that it is flexible enough to conform to irregularities in the surface being ground, though special devices are usually required for such operations. Coated abrasives manufacturers make careful check tests of the backing to insure its possession of uniform firmness so as to prevent the abrasive from receding into the backing. The backing must be also sufficiently tough to withstand the strain of continuous high speed operation and heavy grinding.

The use of waterproof adhesives has greatly increased the applications of coated abrasives in the metal working field. The Electro coating method of applying the grains to the backing in contrast to the older gravity method has resulted in an abrasive belt surface of exceptional evenness, permitting tolerances to be held in the region of 0.0005 in. with certain machines. See Fig. 3.

Surfacing Factors

It can be inferred from the foregoing that many variables are encountered in the average surfacing job. The first factors to be considered are the kind and the condition of material to be ground, the amount of stock to be removed and the fineness of finish required. Next, it must be determined by what method the operation will be performed and finally with what type abrasive belts, grit numbers and at what speeds.

Rather than see war plants and other fabricators assume the burden of experimenting, often at the cost of much time and expense, the coated abrasives manufacturers have taken an active part in the solution of their surfacing problems. Not only have the abrasives manufacturers advised on the best methods and means for handling particular products, but they have endeavored to cooperate more generally with fabricators through comprehensive plant surveys undertaken by engineers or field representatives experienced in coated abrasives applications. In such surveys careful study is made of installation and production costs before recommending changeover from existing surfacing methods to coated abrasives.

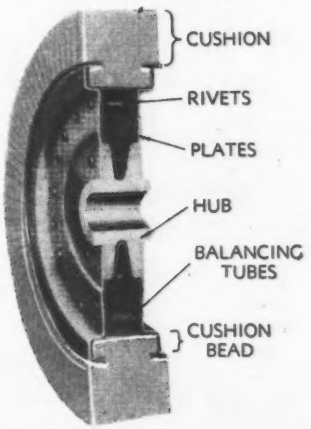
To help expedite plant surveys and solve product surfacing problems proposed by fabricators, Behr-Manning Corp., Division of Norton Co., Troy, N. Y., has set up a coated abrasives applications "clinic." Practically all of the machines described in this article are found in Behr-Manning's clinic and are used for running tests and experiments in connection with customers' surfacing projects. One of its departments is devoted to applications of coated abrasive specialties or "gadgets," such as slotted disks, bands, points, and pencils.*

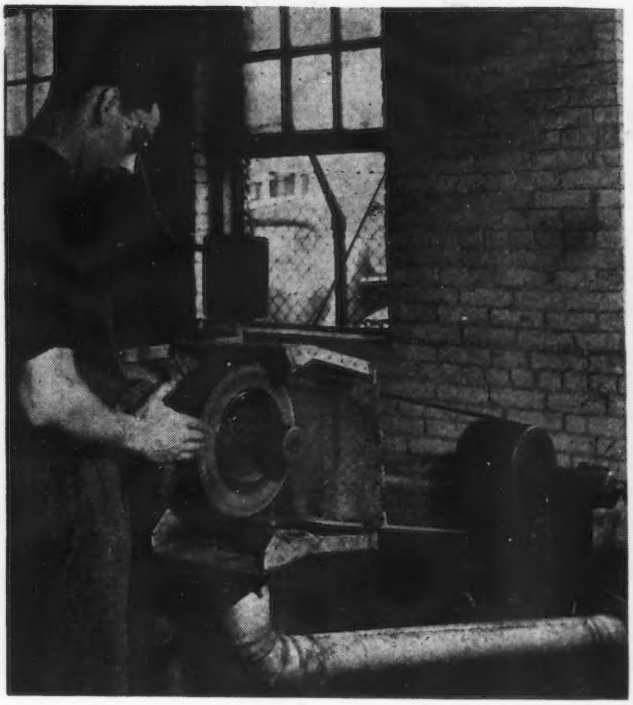
* *See the article entitled "Coated Abrasive Gadgets Speed Finishing Operations" in* THE IRON AGE, *issue of February 25, 1943, p. 48.*

Surfacing with coated abrasive belts can better be appraised if the machines are separated according to three functional groups. In the first group are the machines which depend upon a contact wheel for efficient stock removal and finishing. In the second group are machines which have been designed for finishing parts having uneven surfaces or recesses, advantage being taken of the flexibility

FIG. 4 — Cutaway section of leather compress wheel showing segmented construction. The leather wheel is advisable for hard cutting work; a canvas wheel for moderate cutting and finer finishes.

Courtesy—Divine Brothers Co., Utica, N. Y.





ABOVE

FIG. 5—Polishing jack formerly used with a set-up wheel has been converted for use with abrasive belt by installation of floor model backstand idler.

RIGHT

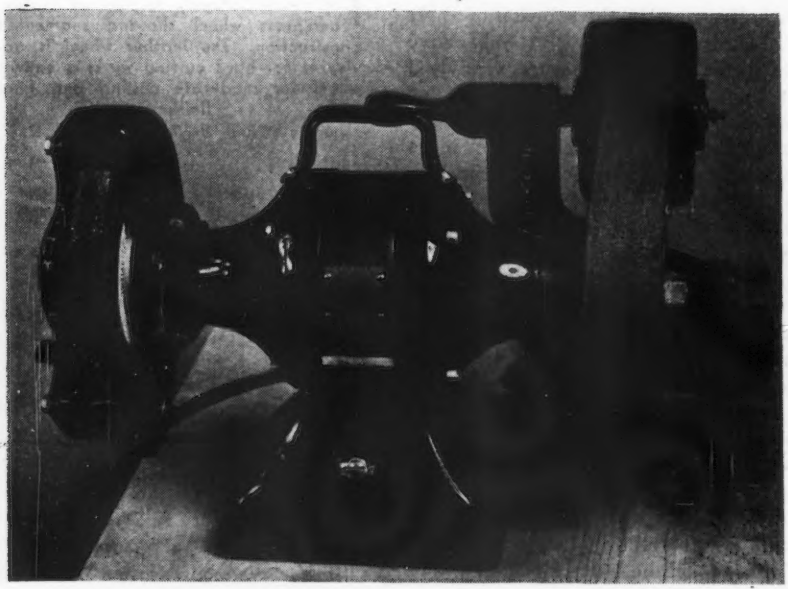
FIG. 6—Steel motor cases being ground with coated abrasive belt having wall mounted backstand idler.

of the grinding surface permissible with the belt. In the third group are the machines which approach a precision finishing status.

Contact Wheel

Surface finishing with an abrasive belt usually requires a cushion roll or wheel under the belt to provide a resilient backing at the point of contact with the work. The combination of the belt with a contact (or compress) wheel constitutes the functioning elements of some of the machines especially fitted for surfacing rounded or irregular shaped parts. Contact wheels are made up of canvas, leather or rubber and can be had in a number of densities, Fig. 4. The cushioning effect of the wheels contributes towards proper cutting action by permitting the belt to conform to the surface being ground, distributing the grinding action evenly over high and low spots. Contact wheels have sufficient firmness to give a positive belt drive and at the same time to prevent glazing and premature belt wear. The economical operation of the belt depends on the selection of a contact wheel that is of the appropriate density in relation to the work.

FIG. 7—Extending the usefulness of a bench grinder by installing a bench backstand idler and substituting a contact roll for the grinding wheel.



Converting to abrasive belts from setup wheels is accomplished by substituting a contact wheel for the setup wheel and installing a backstand idler. Fig. 5 shows a floor model backstand idler. It can be arranged for right or left hand operation. A backstand idler for wall installation may in some instances be more convenient from point of view of space requirements, Fig. 6.

Because of the long belt used, satisfactory heat dissipation is obtained, preventing discoloring or burning of the piece being ground. Several widths of belts can be used. Backstand idlers have such fixtures as lateral alinement and belt tension adjustment to prevent belt breakage and for smoother running. There is also included a safety device which prevents the belt tension weight from exerting too great a pressure on the belt when starting.

o o o

FIG. 8—A belt type Fox swing frame grinder mounting a Metalite cloth belt for the removal of weld seams from armor plate.

o o o

The factors involved in converting to abrasive belts from setup wheels are brought out by an actual case history. As the result of a survey by coated abrasives methods engineers in the plant of an automobile manufacturer making 155 mm. artillery projectiles, a battery of 16 setup wheels were converted over to belts. By the belt finishing method projectiles were handled at the rate of 60 per hr. against 20 per hr. by the setup wheel. Each belt was good for 60 projectiles before it was replaced at a cost of 62c. whereas the setup wheel averaged 9 projectiles before it was necessary to replace glue and abrasive grain at a cost, including labor, of 55c. The cost of finishing was lowered from 14c. to 3c. per projectile. As the numbers of projectiles ran into hundreds of thousands, the savings accrued made up many times for the modest installation investment.

Bench grinders may be converted for abrasive belt application by using a contact wheel and a bench backstand idler, Fig. 7. Bench lathes also can be converted to abrasive belt grinding through the use of this same unit. A contact wheel or roll of semi-soft density is generally satisfactory for application on the bench grinder or lathe. Complete bench backstand units with idler and jack are likewise available. In such cases the idler unit is mounted on a substantial base equipped with slotted holes to line up the idler at the required distance from the jack or arbor.

Floor type backstands are manufactured by such companies as Wy-

o o o

FIG. 9 — Grinding the beveled edge of armor plate with a specially designed belt sander with a coarse grit (No. 24) heavy duty Metalite cloth.

o o o

ABOVE

FIG. 10 — Finishing the slot of parachute hardware with specially designed belt machine.

o o o

RIGHT

FIG. 11—Mead deburring unit using ½-in. belt. Note how the operator controls the tension, hence the flexibility, of the belt by pressing on pulley arm.

degrees of flexibility in which abrasive cloth belts are available. All cloth backings are especially woven and treated to overcome stretch. Belts having a maximum flexibility are used when required to rotate around small pulleys or spindles of a radius as small as ¼ in. In Fig. 10 is shown a battery of specially designed belt machines to finish the slot in parachute hardware. Here the belt goes around a thin spindle which can enter the slot.

song & Miles Co., Greensboro, N. C.; Neiderst Co., Chicago; Mattison Machine Works, Rockford, Ill., and Divine Brothers, Utica, N. Y.

Both floor types and bench model backstands are the products of the Hammond Machinery Builders, Inc., Kalamazoo, Mich.; Jones Engineering Co., Elwood City, Pa., and Porter-Cable Machine Co., Syracuse, N. Y. Porter-Cable also makes a wall unit.

Swing Frame Grinder

The swing frame abrasive grinder has broadened the applications of the abrasive belt making it adaptable to the surfacing of hot-rolled armor plate after pickling, edging armor plate, grinding out welds and numerous operations on castings and forgings, Fig. 8. On such work these machines will cut faster and remove more metal than solid grinding wheels. One factor permitting reduction in grinding costs is the better finish produced.

Suspended in true balance the swing frame abrasive belt grinder rolls forward or backward on an I-beam, and may be swung in any direction while in the process of grinding. Bars, billets and sheets can be ground with equal ease and speed.

In the swing frame abrasive belt grinder, made by Fox Grinders, Inc., Pittsburgh, the belt operates over two pulleys—an adjustable idler and contact roll. The power by a 7½ hp. motor is transmitted directly to the contact roll by means of V-belts running over sheaves. The abrasive belt is alined by means of a control within easy reach of the operator and is tightened automatically. The standard roll has a 4 in. face and is 11 in. in diameter. An abrasive belt size 4 x 141 in. is used. The belt speed is approximately 7000 ft. per min.

The Jones Engineering Co., Ellwood City, Pa., makes swing grinders in three models: No. 300, with 5 hp. motor; No. 307, with 7½ hp. motor, and No. 3110 with 10 hp. motor. The Jones company supplies pedestals for each size grinder when it is desired to have a stationary mount for the grinder, as when grinding welds from pipes.

The heavy duty grinder shown in Fig. 9 utilizes a leather belt moving over a platen. This eliminates friction and provides cushion and support for the abrasive belt. By means of a guide or backing a flat portion of the belt does the cutting thereby permitting more accurate control of the surface produced. This machine has been especially designed to sand the beveled edges of armor plate.

The second group of machines to be discussed makes use of the various

One of the most popular of the abrasive belt machines is the deburrer, used for quickly removing burrs left from sawing or shearing of structural shapes, such as angles, ties and channels (Fig. 11). In the case of die castings, prior to the advent of this machine, the trimming of the light burr or "lace" had to be accomplished by hand filing or scraping. These jobs can now be done in a fraction of the time formerly required by using a deburrer with narrow belt, with or without a platen. In a government arsenal, manufacturing rifles, a remarkable increase of production resulted when hand filing was abandoned for abrasive belt deburring machines.

Belts varying from ½ to 2 in. can be used. Inexpensive belt platens of various radii can be made for accurately grinding radii and concave surfaces. Irregular contours can be ground on the portion of the belt

above the platen. The table which comes with these machines can be tilted for grinding other than right angle surfaces.

When finishing a parachute buckle forging, the deburring belt reaches into corners and angles, leaving an excellent surface. A special fixture may be used so that the slot of the forgings can be ground without removing the belt or stopping the machines.

Mead Specialties Co., 15 South Market Street, Chicago, manufactures an excellent, inexpensive deburring unit which enjoys great popularity. Hammond Machinery Builders, Inc., Kalamazoo, Mich., offer their Model F-2, flexible belt grinder-polisher, which has a heavy frame, spring belt tension and belt tracking device, and sealed-for-life ball bearings.

Especially practical for grinding small radii is a unit manufactured by Stuart Industries, Inc., 75 Bellevue Street, Newton 58, Mass. The Stuart Abrazor fits all drill presses with upright columns from 1¾ to 4 in. and swings out of the way when not in use, thus leaving the drill press immediately available for normal functions. The abrasive belt moves around a spindle that runs 11 times faster than the drill press spindle. Small radii and other intricate places can be reached without a machine setup.

Wet Belt Surfacing

Water or other coolants can be used on abrasive belts to avoid heating and warping, flowing or temper change. It is possible for an unskilled operator to attain tolerances of ±0.0005 in. using the wet belt surfacer which came into the field after the coated abrasives manufacturers provided a waterproof abrasive belt. Besides eliminating the dust and fire hazards, a much longer belt life can be had by the wet belt method.

The wet *and dry* belt surfacing machines, Figs. 12 and 13, are the product of the Porter-Cable Co., Syracuse, N. Y. A similar line is manufactured by Hammond Machine Builders, Kalamazoo, Mich. In these machines, water is sprayed on the belt after it has rounded the upper pulley. This prepares the cutting face of the belt for its job of cutting as it passes over the platen. The steady flow of lubricant over the face of the belt retards loading which, in turn, results in cooler, freer cutting action. It also results in better finishes and longer belt life. As the belt rounds the bottom pulley, the working slush is thrown off its surface by centrifugal force.

Many pieces that might otherwise be considered light grinder, miller and shaper jobs can be done free hand on the belt. The entire piece can be applied to the belt and all raised surfaces ground to the required level at the same time, as illustrated in Fig. 12. For this cutting operation, a coarse belt is selected to give a finish that is free of cutter or tool marks, or burrs. Subsequent finishing operations are unnecessary, unless a finer finish is required. Much time is saved getting a job into production as less setup and lockup time is consumed, since the cutting element moves in one direction and does not present the problem of strain. When working to close tolerances a jig of simple design may be utilized. The greatest saving of time is based

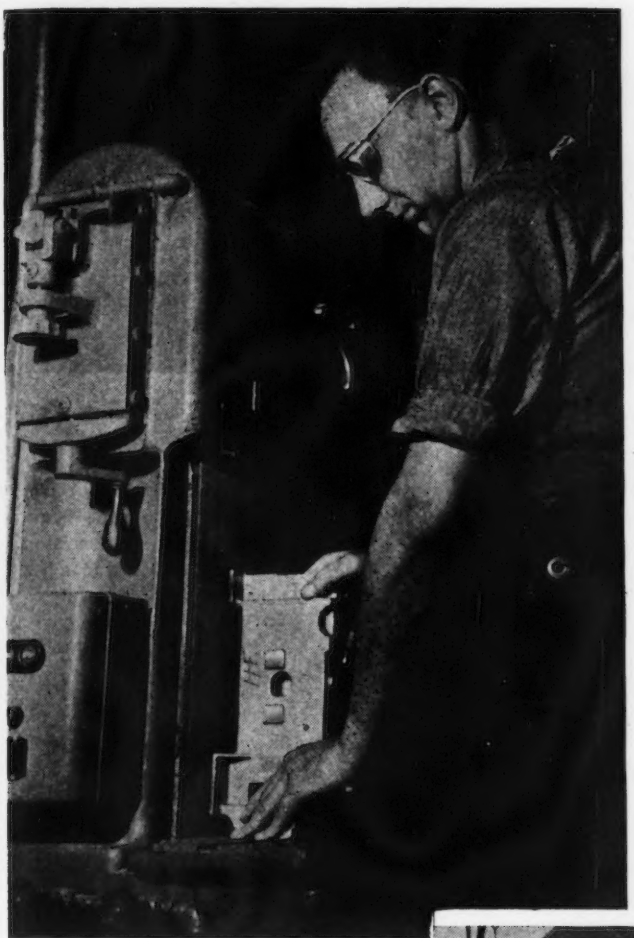


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FIG. 12—A Porter-Cable model G-8 wet sander in production use. The job is actually being done wet though the water does not show.

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BELOW

FIG. 13 — One of the sanding rooms in a large war plant where girls are employed for deburring the edges of various small parts. The two machines at the far side of the room are Porter-Cable G-4 wet and dry belt surfacers.

on the capacity of the flat belt to surface large areas in one operation. To illustrate this a gun mount bearing formerly faced on a lathe at the rate of 4 per hr. is now being surfaced on the belt at a rate of 2 per min.

Porter-Cable and Hammond Machinery Builders both provide models which may be used wet by attaching to the city water line and draining direct to the city drainage system. These machines are equipped with recirculating systems which permit their operation independently of the city water line and drain, when it is desirable to use a commercial coolant. Provided also are a variety of platens, among which will be found those accurately surfaced for precision work and, of equal importance, oscillating tables with micro-adjustment.

For surfacing steel an aluminum oxide cloth belt is recommended, such as Behr-Manning's Metalite cloth. Magnesium alloys are ideally suited to the wet belt method, since the coolant makes it possible to surface and shape the material rapidly and without distorting even thin sections. For magnesium, aluminum and other soft metals, a waterproof silicon carbide belt, such as Speed-wet Durite Cloth, is recommended if the job is to be done wet or with a commercial coolant. Where the operation is to be handled dry, a regular silicon carbide belt is recommended. For the sanding and finishing of glass, tile, plastics, and other ductile materials, silicon carbide belts are preferred, using the waterproof or the dry type according to the operation at hand.

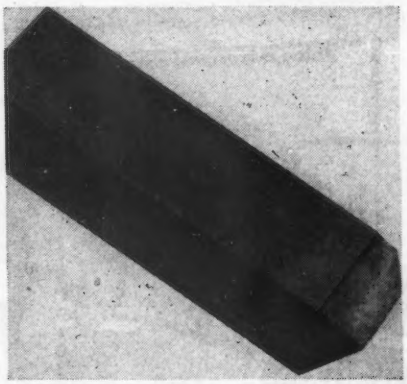
FIG. 14—Finishing the head of a torpedo on a vertical abrasive belt machine.

Shown in Fig. 14 is a specially designed vertical sander for finishing a large, odd-shaped torpedo tube head. A high degree of surfacing precision has been made possible by using a jig table and controls.

Powder Brazing Alloys for Tipping Tools

CARBIDE and high speed steel tipped tools are generally tipped by preplacing a strip of brazing alloy, together with a sufficient amount of flux, between the tip and the shank. The assembly is then placed in a furnace or heated with an induction coil. This procedure, however, is sometimes objectionable, as the foil may become tarnished or oxidized and then require a temperature considerably above its own melting point to flow freely.

Experiments have proved that the use of alloys in powder form presents certain advantages over the use of silver brazing alloys in the form of foil. Two silver-copper and one copper alloy are now available in a fine powder form for tipping tungsten carbide and high speed steel tools. These alloys are economical in use since the required flux is mixed with the powdered alloy. This eliminates any waste of flux during preparation. Then, too, the powder does not require the special handling necessary for cutting the foil into small pieces for exact preplacing.



HIGH speed steel tip brazed to a low alloy shank with EutecRod 1800 powdered copper alloy, showing the clean joint obtained.

These alloys are the product of the Eutectic Welding Alloys Co. and are known as:

EutecRod 1800 (lowest melting) for H. S. S. 940-1140 deg. F.
EutecRod 1601 (high tensile) for tungsten carbide 1020-1250 deg. F.
EutecRod 16 (high tensile heat resistant) for tungsten carbide 1300-1750 deg. F. (furnace temp.)

After the customary degreasing and grinding, the powdered alloy is spread on the surfaces to be joined and the tungsten carbide tip is placed on top. The assembly is then heated until the alloy melts. The metal flows freely at a very slight increase in temperature above the melting point since the weld metal is pulverized. Oxidation of the tungsten carbide is prevented, as each particle of molten alloy immediately "tins" and adheres to the surfaces being joined.

Many manufacturers of tipped tools have already adopted this new process.

Fatigue and Tensile Test Specimens Prepared by Grinding

RELIABLE determination of specifications for steel requires uniform and accurate test specimens. Two grinding machines equipped for preparing specimens have been furnished by the Brown & Sharpe Mfg. Co. for use in the laboratory of a prominent steel manufacturer.

R. R. Moore Standard fatigue specimens have the radius ground on a No. 13 universal and tool grinding machine as shown in Fig. 1. Requirements for this work shown in Fig. 2 are that the form must be a radius of approximately 3½ in., and that the direction of the grinding wheel marks will be parallel to the axis of the specimen.

The method employed for doing this job has the grinding wheel located above the work and rotating at right angles to the direction of rotation of the specimen which is rotated on dead centers and is located in proper relation to the grinding wheel by table adjustment. Vertical adjustment of the grinding wheel head is used for stock removal and sizing.

Truing of the straight grinding wheel is done by mounting a wheel truing fixture on the table and manually traversing the transverse wheel head slide. This method can be used to grind any radius within the range of wheel diameters of the machine.

Fig. 3 shows a B. & S. No. 12 plain grinding machine arranged to grind A.S.T.M. 2 in. tensile test pieces. Requirements for this work, shown in Fig. 4, are that the form will be 0.505 in. diameter in the center and 0.507 in. diameter at each end of the form, then going off at 30 deg. into space.

The method utilized is plunge-cut grinding with a formed grinding wheel, the work being rotated on dead centers. The form is produced on the grinding wheel by moving the follower or stylus of the truing attachment, which is on the table, past the master form which is mounted on a bracket fastened to the bed of the machine. The forming movement is by power table travel. The slide in the truing attachment, which holds both the diamond and the stylus, is kept in contact with the master or former by a spring.

After truing the wheel, the table is moved to the right against a positive stop, thus positioning the work ready for grinding with the independent automatic cross feed. This method gives a uniform reproduction of the form regardless of wheel wear. Any form can be ground by this method provided that no portion of the form is greater than a 30 deg. angle with respect to the center line of the work.

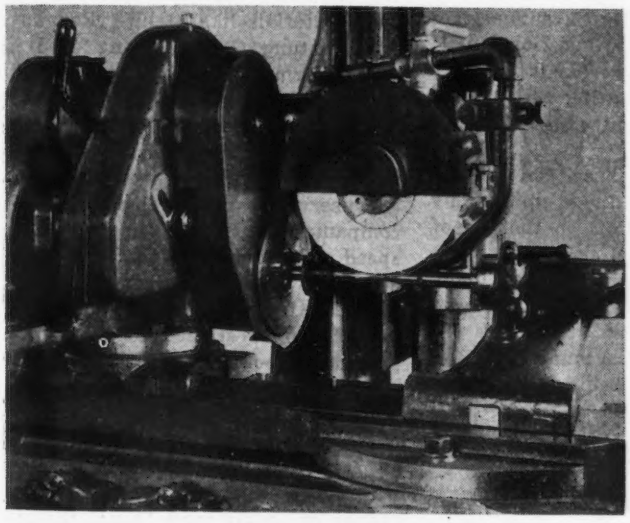


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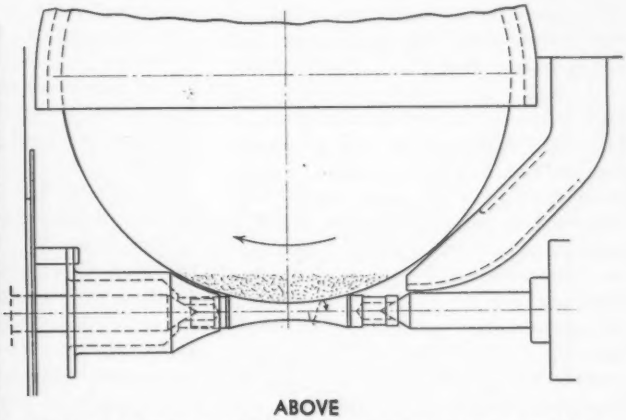
FIG. 1—Setup for grinding a standard fatigue test specimen on a No. 13 B. & S. universal tool grinder.



ABOVE

FIG. 2—Relation of wheel to work in grinding Moore standard fatigue test specimen.

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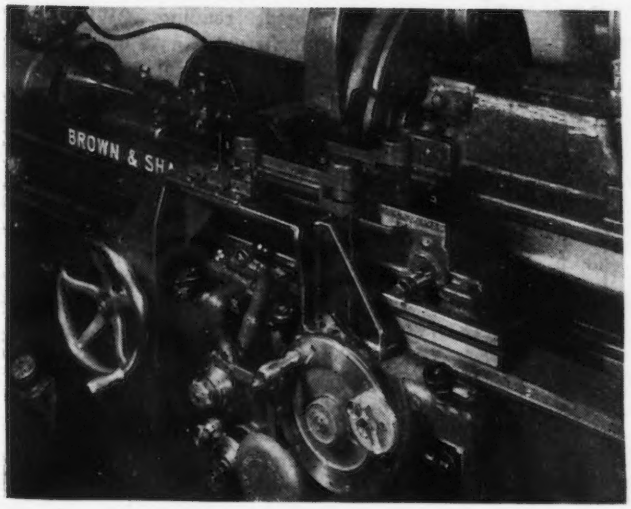

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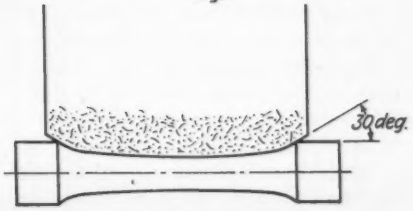
FIG. 3—Plain grinding machine with special dressing attachment for plunge grinding a tensile test specimen. Wheel is shown in dressing position.

BELOW

FIG. 4—A.S.T.M. 0.505 in. tensile test specimen as formed by plunge grinding.



▲ ▲ ▲ Tipped High Speed Steel

UNDER the pressure of wartime necessity and material shortages, many firms during recent years have resorted to using even such common cutting tool materials as 18-4-1 high speed steel in the form of a tip rather than in solid shank form. Numerous articles have appeared in the technical press describing these methods, but it was not apparent as to how extensively these practices were actually being applied. To find the answer a questionnaire was directed to about 1500 plants in the metal working industry, principally those manufacturing machinery of various kinds and transportation equipment, including automotive and aircraft manufacturers. Both large and small firms were canvassed, but none smaller than a capitalization of $100,000. Although the questionnaire was rather lengthy, it was in such form that answers could readily be indicated merely by placing a check mark on the particular type of practice or material being used in the plant making the reply. It is realized, of course, that questionnaires have been the bane of industry for the past several years, but it was felt that by directing these questionnaires to the work managers of smaller plants and the tool supervisors of large plants it would be possible to obtain a fairly high percentage of replies. Unfortunately this proved not to be the case; replies were received from about 10 per cent of those canvassed. It can be safely assumed that many did not reply because they were not using these conservation measures. Although the percentage of returns was low, sufficient data were accumulated to indicate that these practices are fairly widely used in industry and that many companies plan to continue these conservation practices after the war has relieved the strain on the supply of strategic metals like tungsten, chromium and cobalt—as will be seen later, however, not all considered the conservation of materials the primary objective, putting certain operating advantages ahead of this factor.

While the chief purpose of the survey was to discover how extensively high speed steel was being used in tipped form on single point cutting tools, it was obvious that other data would be uncovered relating to cemented carbides which are normally used in tipped form and in the questionnaire an effort was also made to find out what other methods of conserving material, by extending tool life, were being employed. Unfortunately, in retrospect, the questionnaire appears ambiguous to the extent that in the beginning it did not limit the questions too specifically to high speed steel tipping practice. About one-third of the replies, for instance, dealt solely with carbide tipping practice. Fig. 1 summarizes the answers given to question No. 1: "Does your company make it the practice to use the following cutting tool material in tipped rather than in solid form?"

As can be seen, based on 141 replies, the answers divide up roughly in the ratio of 1 to 2 on the use of the high speed steel in tipped form. It is surprising to note that many fewer companies tip the molybdenum types of high speed steel. This inconsistency may be accounted for due to the question not being fully understood. One reply had the word "Moly" written in place of the cobalt grade. It is interesting to note that three companies reported using only the cobalt grades of high speed steel in tipped form. As an aside, it might be pointed out that in a recent article in THE IRON AGE, it was shown that high cobalt, high speed (up to 20 per cent Co) hardened to a few points above the Rockwell C hardness generally specified, gave almost double the performance life over solid high speed steel tools when a cushioned type of braze was employed.

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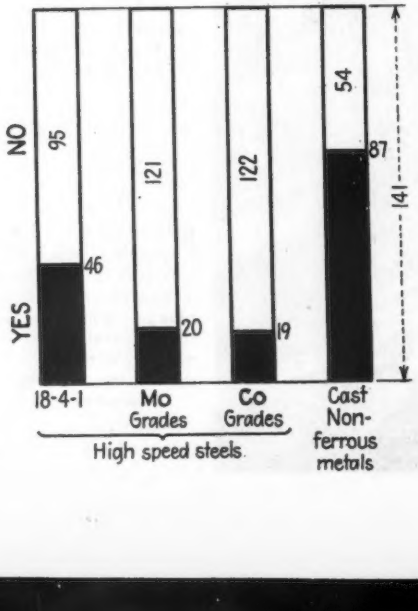
FIG. 1—Tabulations of Yes and No answers to the question: "Does your company make it the practice to use the following cutting tool materials in tipped rather than in solid form?"



About 55 per cent of those replying indicated that the cast non-ferrous materials like Stellite, Rexalloy, and Tantung G were being used in tipped form rather than solid shank. A much higher percentage would normally be expected.

In answer to the next question, as to when tool tipping was started as a conservation measure, most of the companies reporting tipping high speed steel indicated that they had begun to do so between 1940 and 1942. In fact, the largest group of manufacturers started to adopt this procedure about two years ago.

Surprisingly enough those manufacturers who reported using cast non-ferrous metals in tipped form, indicated that they had done so only within the last few years also, although one reply read, "Since Stellite was first marketed." The question itself was poorly phrased since it was double-edged, reading, "When was tool tipping started as a conservation measure?" Several put down a forthright "Never" to this one and implied, thereby, that tipping was done for some other reason than to save an expensive, high alloy material.

Tool Types Distinguished

Finding out the extent to which tipping of high speed steel is applied by class of tool proved somewhat difficult—and there is little doubt that in the figures cited below cast nonferrous grades are included as well as high speed steel, since no provision was made to differentiate them. The question was divided as to four types: Single point tools (lathe,

Widely Used, Survey Shows

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By FRANK J. OLIVER

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. . . When the supply of alloying elements for high speed steel became critical a couple of years ago, many methods of using this cutting tool material in tip rather than solid form were publicized. To discover to what extent these practices have actually been put to work in industry, a survey was conducted, the results of which are summarized in this report, first presented before the 1944 annual meeting of the The American Society of Mechanical Engineers.

planer), dovetail form tools, flat form tools, and other types, which each company was asked to name.

Of 35 companies reporting on the extent of tipping to single point lathe tools, 14 firms applied tipping to 30 per cent of their tools or less, 7 from 50 to 75 per cent of their tools, and 14 shops to 80 per cent or over. The biggest group—namely 8—applied tipping to 90 per cent of the single point tools used. To a lesser extent, tipping is applied to planer and shaper tools. The returns on this score are too spotty to tabulate.

Out of 43 firms which reported tipping only the cast non-ferrous grades, 6 applied tipping to 35 per cent or less of their single point tools; 12, from 40 to 60 per cent inclusive; 9, from 75 to 80 per cent; and 7, from 90 to 100 per cent.

Of the 17 returns reporting tipping of high speed steel dovetail form tools, 11 tipped from 2 to 25 per cent of such tools, the remainder from 50 to 100 per cent. Most of the reports in the latter category tipped the cast non-ferrous materials as well as high speed steel.

Out of a dozen firms which tipped dovetail form tools with the cast non-ferrous grades, but not with H. S. S., the amounts ranged all the way from "some" to 100 per cent, with three-quarters of them applying tipping to 25 per cent or less of this class of tool.

The survey showed that 29 firms tipped flat form tools with high speed steel (some with cast non-ferrous materials also). Of these 20 applied tipping practice to 30 per cent or less of their tools. Of the remaining 9, 4 applied tipping to 75 per cent or more of their flat form tool requirements. Out of the 87 shops which reported tipping tools with the cast non-ferrous cutting metals (but not with high speed steel) 21 noted that they applied tipping to flat form tools. Of these, 11 tipped 25 per cent or less of these tools with this material. Of the remaining 10, 4 tipped 75 per cent or less of these tools and 3 tipped 100 per cent of their flat form tools with this grade of material.

Included in the miscellaneous types of tools tipped with high speed steel were listed counterbores and reamers, circular form tools, milling cutters, multiple planer tools, boring bars and special form tools. Milling cutters predominated, but the total number of firms reporting this phase of activity was small. Milling cutters and circular form tools also predominated among the "other type" of tools tipped with the cast non-ferrous metals.

Many of these tools are purchased today in tipped form, but a large percentage of those reporting stated that they tip their own tools with either high speed steel bits or with the cast non-ferrous grades.

Brazing Methods Described

Tipped cutting tool materials may be brazed to low alloy shanks by several methods, one or more of which may be and often is employed in the same plant. Discounting those firms that were apparently reporting on carbide practice only, the tally showed the following:

Low temperature brazing (silver soldering) 71
Copper brazing 22
High temperature brazing (ferro-alloy cement) 18

The most popular proprietary brands of silver solder and equivalent low temperature alloys recorded were Easy-Flo No. 3, Sil-Fos (phosphor silver) and Castolin Eutectic Nos. 16 and 1800. Cinch Steel Cement, Crumoid, Tip-it and Ferroid flux were mentioned as proprietary brands of high temperature cements.

According to this survey, heating with an oxyacetylene torch is by far the most widely used method of heating the shank prior to tipping. This was to be expected, since it is the simplest and cheapest method. There were 78 check marks on this method of heating, compared with 32 for use of a muffle furnace and 13 for induction heating. There was one mention of salt bath heating.

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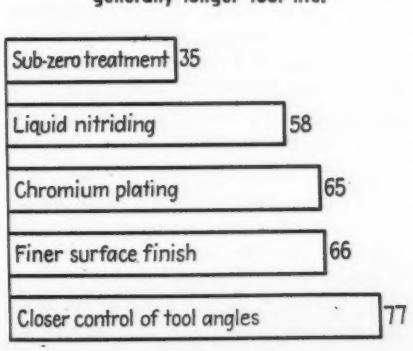
FIG. 2—Number of mentions of methods currently being discussed for obtaining improved tool performance and generally longer tool life.



Question of Heat Treatment

Most shops that reported tipping of high speed steel with silver solder, using the oxyacetylene torch for heating, indicated that no subsequent heat treating of the tip is required, although several gave the tools a slow cool in lime or Sil-O-Cel. Although the melting point of the silver solders, at 1300 deg. F., is somewhat above the temperature required for drawing high speed steel, the time at that temperature is so short that subsequent heat treatment is not needed. Of course, if annealed stock is used for the tips, these must be hardened before brazing takes place. More often than not, salvage pieces of high speed steel, including worn inserted

tooth milling cutter blades with the serrations ground off the back, are frequently used for tipping single point cutting tools.

Where the brazing is done in a muffle furnace, either a single draw at 1050 deg. F. or a double draw, first at 1100 deg. F. and then at 950-1000 deg. F., is given the tool after brazing in the same furnace.

Only one concern reported the use of subzero treatment of tipped tools after brazing—drawing at 1030-1050 deg. F. after quenching from the brazing temperature, then freezing at —90 deg. F., followed by a draw at 980-1000 deg. F., and a second freeze at the same low temperature.

High temperature brazing with ferro-alloy cements like Cinch, Crumoid, Tip-it require the same heat treatment as for hardening solid high speed steel tools. After the cement powder has been applied, the shank and tip are preheated to 1600 deg. F., then brought up to the hardening temperature for the particular grade of tip. Upon withdrawing the tool from the furnace the surplus cement is squeezed out in a hand arbor press and then the tool is quenched in oil or air. Pressing the tip in place gives it sufficient adhesion to allow the tool to be handled safely.

In this connection it is of interest to quote this comment, presented at some length, because it runs counter to general experience disclosed in this survey:

"The salvage of H. S. S. tool steel materials has been practiced by this company ever since the development of low temperature brazing. The ends of worn out H. S. S. solid tools are brazed together, thus obtaining additional life. No good results, however, have been obtained in H. S. S. tool tipping, since the melting point of the low temperature brazing medium is so near to the draw temperature of H. S. S., that it is difficult to control, especially when considering the present manpower that is available.

"Toolholders, in which H. S. S. tips are held in place by clamping, are used in the toolroom, but are rarely used in production, due to the larger size, difficulty in grinding by the operator, and restricted heat transfer in comparison to the solid tool.

"Stellite type tipped tools are used to a great extent, but the use of carbide tipped tools is far greater, with the drawback, however, that the latter cannot be ground by the operator, but must be maintained by the tool grinding department.

"The use of solid Stellite type tools will be continued in sizes up to ¾ in. since the upkeep of abrasive parting wheels overshadows the economy of Stellite tipping, considering the maintenance of these tools. All tools over ¾ in., however, will be continued as tipped tools."

Welded Tipping Practice

The question was also raised as to whether tips were welded to low alloy shanks and by what process and using what type of welding rod. Replies to this question were confused to some extent. Since even the manufacturer of Castolin Eutectic alloys refers to the process as welding rather than brazing or silver soldering, it is not surprising that users listed this method of tipping either as welding or brazing. For the purpose of this survey, however, these materials are better classified under low temperature brazing.

Of 17 shops which tip high speed steel and the cast non-ferrous materials and which use the welding technique, 14 employ gas welding and 8 arc welding, including 5 in each group that weld either way. Of the companies that limit tipping to the cast non-ferrous materials, 12 reported the use of welding, seven by the gas technique and five by both gas and arc. The type of rod or electrode listed varies over the whole range of possibilities, from ordinary low carbon steel to Stellite, probably applied as a facing material. High speed steel rod is by far the most popular for welding that class of tip. Trade names mentioned include Gorham, Suttonite No. 2, American Agile, Eureka 70W and 71M and Toolweld. Stainless steel is apparently suitable for welding both high speed steel tips and the cast non-ferrous grades. Being autenitic in character, it does not harden and leave a brittle weld. Nickel was named on one blank and No. 1215 air hardening rod on another.

In answer to a question concerning heat treating procedures following welding, the replies were few and spotty. Most indicated that none is required and while this is obviously the case for the cast non-ferrous grades, which are not affected by the welding heat, it is equally obvious that both gas and arc welding would draw the temper of high speed steel unless the low temperature welding alloys are employed. On only two blanks was it indicated that after welding, the tips are heated locally to 2200 deg. F. and then oil quenched or allowed to cool in air, followed by a draw at 1050 deg. F.

The question, "In general, are higher hardnesses employed on tipped tools than on solid high speed steel tools?" apparently was badly phrased, judged from some of the responses obtained, particularly in the light of the Rockwell C hardness values noted. Four noted hardnesses around 90, for example, which is a Rockwell A scale value for the carbides.

As would be expected, for the cast non-ferrous materials the same hardness is used on both tipped and solid tools. Thirteen replied that higher hardnesses were sought on high speed steel tips than on the solid tools. Two specified hardnesses in the range of

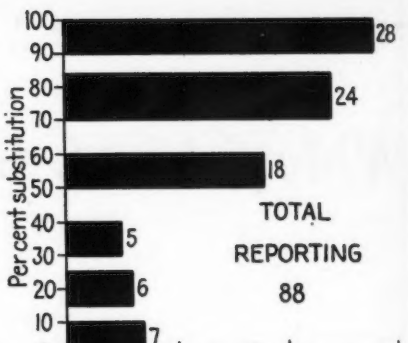


FIG. 3—Extent to which 88 companies report the substitution of cemented carbide cutting tools for high speed steel in machining cast iron.

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65-68 Rockwell C, one up to 67, three to 66, and six to 65 R_c. Higher hardnesses can be safely employed on the tip since there is no danger of cracking the shank, which may be heat treated to give strength and toughness to resist clamping loads and cutting shocks. Longer tool life can be expected from the harder tip.

Shank Materials

Earlier, mention was made of tipping the high alloy cutting tool materials to "low alloy" shanks. It must be confessed that when data was requested on the questionnaire as to what this shank material might be, it was expected that not more than three or four steels would be named. Instead, there were over a dozen. In the descending order of number of mentions, shank steel in actual use range as follows:

Specification	No. Reporting
SAE 1040	(12)
SAE 1050 and higher in C	(12)
1045	(10)
Meehanite metal	(7)
SAE 1020	(7)
SAE 4140-50	(5)
SAE 2340	(4)
SAE 1035	(2)
SAE X1112	(2)
SAE X1314	...
NE 9442	...
NE 9250	...
NE 9255	...
NE 8630	...

Shank steels mentioned only by trade name included: Maxel, Silman, Solar, Cyclops 67, Beacon, Sanderson carbon steel, and Braze Rite. Most tips are brazed to milled bars, although about one-quarter of those replying to this question indicated that they tipped forged bars as well.

It is impossible to tabulate in any semblance of order the sizes of shanks which are being tipped today. They range all over the map, the survey indicates, from ¼ X ⅞ in. cutoff tools up to 3 x 3 in. squares. One shop listed 3/16 in. rounds. This probably applies to tools of the drill

and reamer type which are "tipped" by flash butt welding. In this connection, only eight returns checked the use of resistance flash butt welding, applied in the few cases noted to small rounds and squares, end mills, reamers and drills. It is realized, of course, that this method of manufacture is employed almost 100 per cent by makers of high speed steel twist drills.

Answers to the question, "What per cent of your high speed tool steel requirements have been saved by tipping?" the writer feels sure were misinterpreted in some cases. Some undoubtedly had in mind the amount of high speed steel saved by switching to tipped carbide tools, since large savings were reported by firms which had indicated elsewhere that they did not tip high speed steel.

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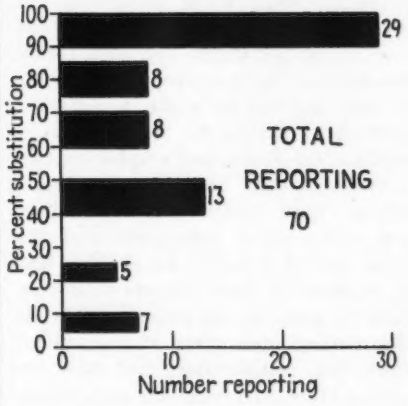
FIG. 4—Extent to which 70 companies report the substitution of carbides for high speed steel in machining non-ferrous metals.



Of those who reported tipping high speed steel, 16 gave estimates of the percentage of high speed steel saved by this process. The answers given are as follows:

Very small percentage	
Very little	
2 per cent	
10 per cent (2)	
20 per cent (2)	
25 per cent (2)	$2,000 annual saving reported by one
50 per cent (4)	Savings of $10,000 and $65,000 reported
90 per cent (1)	
95 per cent (1)	But savings of only $1,500 (a big firm, too!)

One company indicated that it saved all of its high speed steel scrap by tipping and immediately contradicted itself in the next breath by adding that it does not pay to cut up its high speed steel scrap for this use.

Of those shops which reported tipping only the cast non-ferrous grades, 30 gave estimates of the percentage of high speed steel saved by this substitution, ranging as follows in ascending order:

1 per cent (1)	$75 saving reported
5 per cent (3)	One raised the figure to 75 per cent if removable bits were included
10 per cent (1)	
20 per cent (2)	One noted a $1,500 saving
25 per cent (2)	
35 per cent (2)	
50 per cent (6)	One noted a saving of $200
60 per cent (2)	
65 per cent (1)	
70 per cent (1)	$4,000 saving noted
75 per cent (5)	Saving of $1,500 noted by two
80 per cent (2)	
90 per cent (1)	
95 per cent (1)	$3,000 saving noted

Among other less tangible benefits listed by this group were that time was saved, that special tools were obtainable on short notice, that sharp tools were more likely to be used; also that more production, better quality and improved performance and longer runs between grinds could be obtained in most cases due to the higher cutting speeds allowable with the cast non-ferrous grades. Several cited the fact that use of tough shanks not only resulted in less tool breakage, but also less chatter, since it was possible to bear down on the tool holder and get a better grip without danger of cracking the shank. Some observed that economy in material was the main object.

The chief benefits named by those shops that tip high speed steel were that tools were made available when regular sources failed, that the tools were stronger, that they were not dependent upon deliveries from outside sources, and that they could be made more rapidly in the toolroom than solid tools.

To the question, "Will your company continue to use tipped tools after the high alloy steels are no longer in restricted supply?" 19 replied "Yes," mostly for reasons of economy and salvage of discarded cutter teeth. This was in the group of 46 firms which had indicated that they tipped high speed steel. One answer was qualified to the extent that such tools could be purchased (they can) since it was deemed uneconomical to manufacture tipped tools in small quantities in the toolroom. Another added that tipped tools are the only ones that will do the job in some cases. Perhaps this tool supervisor was confusing tipped carbides with tipped high speed steel.

Of the 87 shops which reported tipping the cast non-ferrous grades (but did not include high speed steel), 39 indicated that they would continue to use such tools in tipped form. Again the reason was chiefly one of economy, about half calling attention to the fact that tipped tools are obviously cheaper than solid tools of high cost alloys. Several stated that the proper tool could be obtained on short notice since tipped tools are made in the toolroom rather than purchased on the outside, and again the fact of less shank breakage was given as the reason for an affirmative answer. "It is faster to tip than to forge," wrote one. "No reason for solid tools," said another. "Easier and faster replacement of worn out and obsolete tools," stated a third. "The small tips left from the long tips can be used up with practically no loss," wrote a fourth. Several indicated that the tipped tools performed better, gave greater production and improved quality.

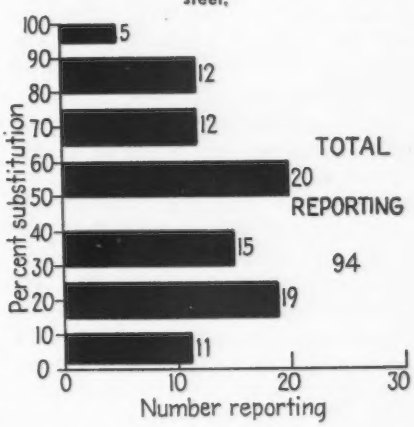
There were a few dissents also recorded. One tool supervisor said tipped tools were more costly in the end. Another said it was doubtful whether tipping would be continued, since the cost of the two types of tools were very close to each other and noted that in the case of form tools, the solid type gave twice the life.

Repair of Multi-Tooth Cutters

A number of questions were asked relating to tool salvage methods and secondly to various techniques being practiced to extend high speed steel cutting tool life, whether tools are tipped or solid. As regards the salvage of broken multi-tooth cutters, 47 firms

o o o

FIG. 5—Extent to which 94 companies report the substitution of carbides for high speed steel in the machining of steel.



or roughly one-third those answering the questionnaire use silver solder, while 27 employ other methods of low temperature brazing, including principally the Castolin alloys. Gas welding with high speed steel rods is used by 20 shops, while nine repair such tools by arc welding with either high

(CONTINUED ON PAGE 137)

Metlbond Adhesive For Metals

By G. G. HAVENS
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. . . By combining two adhesives, one having a synthetic rubber base and the other a plastic base, Consolidated Vultee has developed a high strength bonding agent for metals and non-metals that can be cured under low pressure in inexpensive jigs. The data was originally presented before a regional meeting of the American Society of Mechanical Engineers.

A RECENT trend in aircraft is the use of organic adhesives for bonding together metal and various other materials. It is being recognized by more and more engineers that smooth leading edges, trailing edges and other skin surfaces, so important to high speed planes, require a continuous bond of the skin to the underlying surfaces. Nor is this the only advantage to be obtained from a continuous bond. The stiffness and strengths of assemblies having a continuous bond have been shown to exceed those having intermittent types of fastening such as riveting or spot welding. The continuous bonding method permits the use of unskilled labor in place of skilled labor now needed for riveting and the cost of assembling certain parts can be reduced to a fraction of the present riveting costs.

The need for the development of good adhesives for replacing rivets and other methods of attachment in aircraft has long been recognized; however, it is only recently that this type of development has been given the attention it deserves. The adhesion of rubber to steel through the use of brass plating has been used for years by the rubber industry for such items as shock absorbers, mountings and automobile accessories. Cements, such as rubber hydrochlorides, have also been used for bonding rubber to steel and other metals, including aluminum alloys. Such cements were forerunners of the more recent metal adhesives.

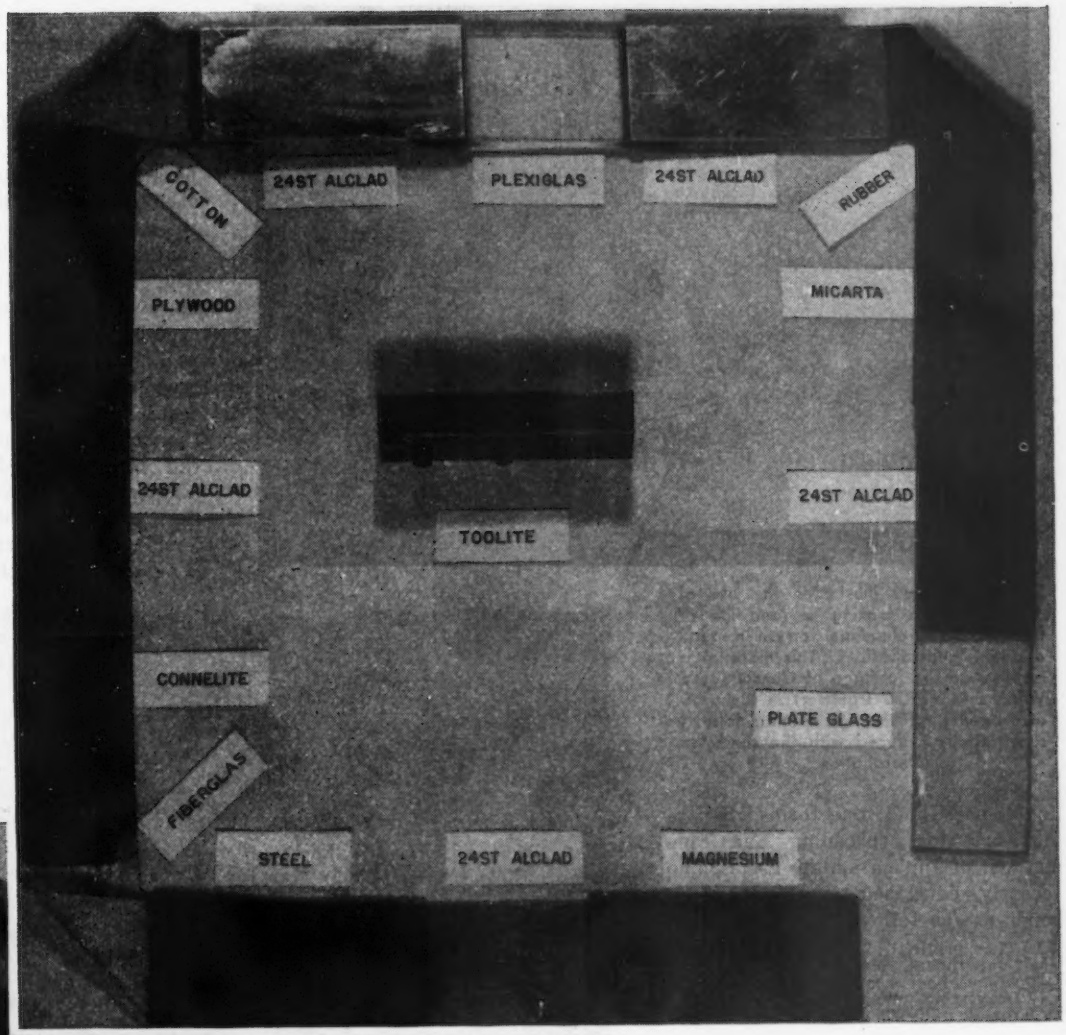
A first requirement of a satisfactory adhesive is adequate shear strength, although this is not the most difficult one to meet. A good adhesive must have satisfactory flexibility, as well as resistance to heat and cold, resistance to aromatics and salt water, resistance to aging and resistance to fatigue. The rubber hydrochloride adhesives were unsatisfactory at temperatures of —70 deg. F. and the shear strengths were not as high as desired. The aromatic and salt water resistance was low and constant bond strength to Alclad alloys was difficult to obtain. More recently there have been two adhesives developed by different concerns that do not have the above difficulties and that would have been practical for large scale use except for the necessity of high curing pressures, necessitating the use of heavy and expensive jigs for assembling aircraft parts.

Consolidated-Vultee Aircraft Corp., realizing the deficiencies of previous cements, undertook the development of a bonding process which would have satisfactory physical properties and sufficiently low curing pressures that expensive jigs could be avoided. Examination of several adhesives requiring high curing pressures showed that adhesion to the metal was not the difficulty but that the high required pressure was necessary to obtain adequate flow of the cement to provide sufficient contact. At first, attempts were made to produce a single cement which would flow at low curing pressures and still retain the desired physical properties. Later it was decided to make a different method of approach. As a result a method was developed employing two adhesives: One having a synthetic rubber base which gave flexibility and adhesion to the metal and the other having a plastic base which had a sufficiently low viscosity during cure to provide the required flow at low curing pressures. It was found that the combination had the required physical properties and, in addition, could be applied in production without the necessity of expensive jigs.

For other articles published in THE IRON AGE on the bonding of metals, the reader is referred to the following: "Joining Light Alloys by Plastic Adhesives," Aug. 19, 1943, p. 52; "The Joining of Metal," by J. Aherne-Heron and L. N. Smith, July 13, 1944, and "The Strength of Glued Sheet Metal," by N. A. De-Bruyne, Aug. 24, 1944, p. 60. All three articles relate to British practice.

Theory of Adhesion

The theory of adhesion is still in an elementary state. From elementary physics it is known that there are two types of forces which hold materials together, cohesive forces and adhesive forces. Cohesion is the attraction between like materials and adhesion is the attraction between unlike materials. The importance of adhesion cannot be over-emphasized. The strength of metals such as aluminum and steel is largely due to adhesive forces. The precipitation of carbon between crystals in carbon steels and copper in aluminum alloys results in high intercrystalline adhesion and accounts for the high strength of these alloys. The low strength of many of the present laminated plastics can be traced to the poor adhesion between the plastic and material which it impregnates. The theory of the new Metlbond type of adhesion is even less satisfactory than the theory for internal metal adhesion. As far as is known now there are three types of forces by

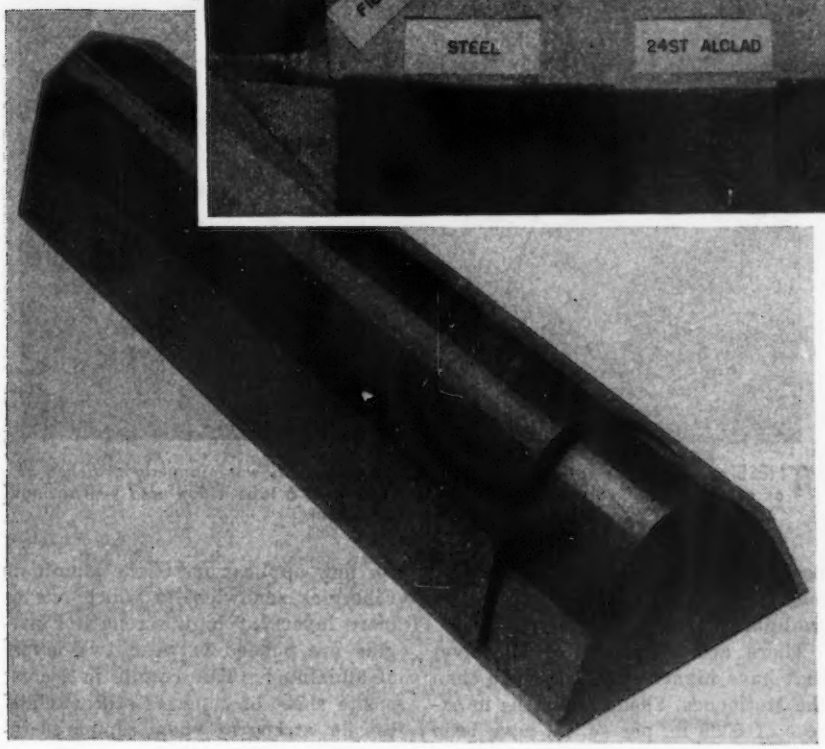


RIGHT

THIS photograph shows a variety of materials which can be joined successfully by Metlbond.

BELOW

ONE of the most significant applications of Metlbond is in the leading edge wing assembly to permit smooth surfaces. Experimental planes have been flying for months with Metlbond leading edges.

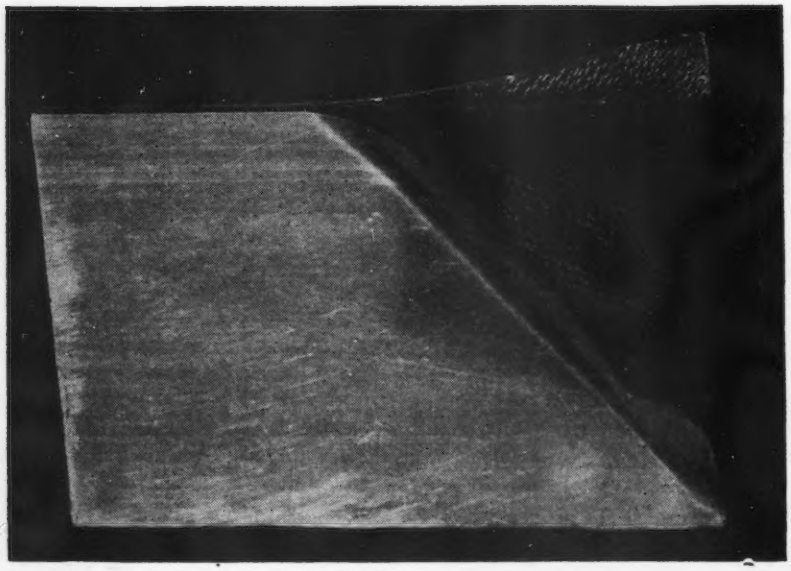


which one can get adhesion of an organic to metal. One is a primary chemical bond between the metal or its oxide surface and the organic chemical. This is the strongest type of bond and the most resistant to high temperatures. Another, the interstitial type of bond, is also of a chemical nature and is usually explained as due to secondary valences. Oxygen, for example, has an ordinary valence of two; but also has two secondary valences. The adhesion of the nylons to glass and other materials is explained on this basis. This type of adhesion may be strong at room temperatures but usually is not as resistant to high temperatures as primary bonds. The third type, mechanical interlocking, is ordinarily deficient in strength. The strength of this type of bond depends on the roughness of the surfaces to be bonded.

In the case of the chemical bonds, the strength is greater, the smoother the surfaces. The best Metlbonds are obtained with smooth surfaces and are comparatively resistant to high temperatures, which would indicate a primary chemical bond. Although these theories may explain adhesion to a degree, there are many materials which according to the theory should have good adhesive properties, but still do not.

In its present use, the name Metlbond is a Consolidated Vultee Aircraft Corp. trade name for a combination of adhesives for bonding metals. Some or all of Metlbond components may be purchased from outside concerns. At the present time most of the Metlbond components were developed by Consolidated Vultee although a number of adhesives developed by others are under consideration.

It was necessary to develop several forms of Metlbond to meet the large variety of requirements needed in the assembly of various production items. Metlbond materials are prepared in



THIS specimen illustrates the use of Metlbond in making a sandwich of fiber glass and aluminum for use in sound deadening installations. This material is applied on the fuselage of Consolidated Vultee's Model 39 transport in the area of propeller rotation. Drumming noise is substantially reduced with the sandwich installation.

liquid, paste and tape forms. Spraying, brushing, spreading and tape methods of application are used. Some recently developed types of Metlbonds are as follows:

1. The original high pressure, high temperature, single phase synthetic rubber base requires 100 lb. per sq. in. curing pressure at 330 deg. F. for 20 min. The adhesive is sprayed on to the parts to be bonded.
2. A low pressure, high temperature two-phase Metlbond requires 15 lb. curing pressure at 330 deg. F. for 20 min. The synthetic rubber component is sprayed and a plastic component brushed on to the parts to be bonded.
3. Two types of tape have been developed. One which requires 250 deg. F curing temperature; the other 330 deg. F. curing temperature, both requiring a curing pressure of 100 lb. The high temperature type has the highest shear strength and best heat resistance, but is not satisfactory where the parts contain certain organics unstable at 330 deg. F.
4. A very low pressure, high temperature Metlbond has been developed requiring a curing pressure of 1 lb. or greater, and a curing temperature of 330 deg. F. The shear strength of this type is approximately two-thirds that of the first two types.

Although the above Metlbonds were developed principally for metals, they also can be used for most solids, such as aluminum alloys, magnesium, steel, zinc, cadmium, Fiberglas, cotton and rayon, several plastics, woods, and rubbers.

The Metlbonding of some materials requires special procedures. The bond between synthetic rubber Metlbonds and glass fails when subjected to prolonged sunlight. To avoid this the plastic type of Metlbond is used next to glass. On the other hand, the adhesion of the synthetic rubber Metlbond to transparent thermosetting materials seems to be unaffected by sunlight.

There are a number of adhesives that have higher shear strength than the Metlbonds. Shear strengths in excess of 6000 lb. per sq. in. have been reported, using plastic adhesives between metals. The shear strength of Metlbonded joints is approximately 3000 lb. per sq. in. compared to about 1800 lb. for the average riveted joints. Wright Field has conducted an extensive test program on various adhesives and finds that plastic joints are too brittle, which results in stress concentrations so that the high shear strengths are realized only on small overlaps and small samples. Also the brittleness results in poor impact and peel resistance. The effect of brittleness is usually accentuated at low temperatures.

A combination of layers of the rubber and the plastic adhesives seems to possess the beneficial properties of each adhesive. The impact and peel resistance of the combination is essentially constant from —70 to +160 deg. F. It should be remembered, however, that none of the continuous type bonds are as good as rivets for peel or stripping resistance. For this reason thin sheets bonded together require a tack rivet at each end of the bond. For most uses Metlbond can be considered satisfactory for temperatures between —70 and 250 deg., and up to 300 deg. for certain applications subject to low stresses.

An example of the use of Metlbond for new applications is the aluminum Fiberglas sandwich, in which one or more layers of high strength Fiberglas are bonded between two layers of aluminum. This results in a composite sheet of superior stiffness and tensile strength when compared to aluminum alloys on a weight basis. More important still are its sound deadening properties. This material is being applied to some of the newer planes and an extension of its use is expected as soon as production facilities become available.

Another example is the attachment of plastics such as Plexiglas to aluminum. Metlbond is sufficiently flexible to allow for the difference in ther-

(CONTINUED ON PAGE 136)

THESE nut plates being used on Liberator B-24 bombers were formerly attached to an assembly with two rivets. Metlbond in the form of a tape is now used with savings and better attachment.

Magnesium Fires Controlled with Sprinklers

AUTOMATIC sprinkler protection is of definite value in the control of fires involving magnesium according to a recent report issued partly by the Factory Insurance Association and the National Board of Fire Underwriters.*

Even though water from sprinklers accelerates the burning of magnesium, sprinklers properly spaced and supplied with adequate water should protect a structure from serious fire damage with burning of considerable quantities of magnesium therein. All tests and experience to date show that water from sprinklers may be applied without structural damage from explosion or violent reaction, and sprinklers should be allowed to operate until the fire reaches the quiescent stage.

In certain other tests and in some fires explosions capable of doing structural damage have occurred when molten magnesium in quantity flowed into water which had accumulated to a depth of several inches from hose streams. Similar results might occur where conditions would permit sprinkler water to accumulate, or would permit a quantity of water to flow onto a mass of molten magnesium, but under automatic sprinkler protection the formation of molten magnesium would be lessened and with proper floor drainage the likelihood of such explosions would be greatly reduced.

When the magnesium in a stack or pile becomes well ignited, it may be expected that a major part or all of the magnesium in that stack or pile will be consumed; automatic sprinkler protection can be expected to prevent the ignition of nearby stacks or piles of magnesium as well as to reduce fire damage to other nearby equipment and materials. When large quantities of magnesium are involved, effective means of separation between stacks or piles should be provided so that the quantities exposed to a single fire will be kept reasonably small. Aisle spaces equal in width to the height of the pile, with a minimum of 5 ft., should be provided.

A fire in nearby combustile materials, burning too slowly to operate automatic sprinklers, may develop enough heat to ignite thin-section magnesium, producing a well started magnesium fire before the operation of automatic sprinklers. Special importance attaches to prompt alarm service, prompt sprinkler operation, and the avoidance of obstructions to sprinkler distribution which would permit combustible materials to continue to burn under sprinkler discharge and result in ignition of magnesium.

Substantially constructed tight tote boxes have considerable confining effect on the burning of magnesium therein. This confining effect, together with the fact that they collect sprinkler water, makes the use of such tote boxes of definite value in the control of magnesium fires by sprinklers. Steel tote boxes are preferred.

Special consideration should be given to details of construction, arrangement, location and protection of structures handling or storing magnesium. These operations should preferably be restricted to ground floors where carried on in combustible buildings. In buildings of combustible floor construction it is especially recommended that the automatic sprinkler protection be extended to any spaces, whether used or unused, located underneath the magnesium occupancy since burning molten magnesium wil be likely to penetrate the wood floor.

Discharge of water on to certain equipment such as heat treating furnaces, and high potential electrical equipment may be avoided by installation of substantial, tight non-combustible shields extending well over such equipment to afford working area for fire fighting. Because of the importance of prompt water application, the sprinkler systems should be maintained at all times in a complete operating condition. The thermal responsiveness and reliability of sprinklers are impaired by corrosion, accumulation of foreign material, painting or damage.

Control of Incipient Fires

An incipient magnesium fire, which has not developed enough heat to appreciably raise the temperature of the unburned metal and the surrounding area, can be extinguished by almost any thermally conductive material which is itself relatively noncombustible, and which does not contain freely available water, chlorine or oxygen. Recommended good practice in the handling of incipient magnesium fires consists in first covering the burning area with an extinguishing agent, then in removing, insofar as feasible, any adjacent unburned material from the immediate vicinity of the fire, using shovels, hooks or whatever tools or methods may be available. Only thoroughly tested extinguishing agents should be used on large magnesium fires.

Good Housekeeping

Strong emphasis should be placed on maintenance of good housekeeping wherever magnesium is handled or stored and combustible materials exposed to magnesium should be maintained at a minimum. This should include orderly arrangement of stocks with proper aisles, and general cleanliness of machines and of floors, walls, overhead beams and ledges, benches and all other areas and surfaces where fine particles of magnesium may collect. All waste magnesium products should be collected as produced and removed from manufacturing buildings to a detached location. Magnesium chips, sawdust, turnings and flashings should be placed in plainly identified covered metal containers, and these should be removed from manufacturing buildings as soon as they become filled.

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* *"Report of Tests on Control of Magnesium Fires with Sprinklers," National Board of Fire Underwriters, 85 John Street, New York 7.*

The reader is also referred to the article "Safe Practices in Working Magnesium," THE IRON AGE, *June 22, 1944, page 64.*

Short Cycle Malleabilization Of White Cast Iron

By E. E. HOWE
Chief Metallurgist,
Chicago Vitreous Enamel Product Co.,
Cicero, Ill.

. . . A reduction in heat treating time is achieved by a procedure in which the massive cementite in the white cast iron is first decomposed and the resulting pearlite matrix is converted to spheroidized cementite, having satisfactory ductility.

ARTICLES made from malleable castings have enjoyed increasing favor due to the desirable properties possessed by this material for certain applications. Increased demand for malleable castings brought about by this popularity has resulted in some difficulty in securing immediate deliveries. To a great part, these delays may be attributed to the time involved in heat treating to secure a malleable structure, and it is not uncommon to encounter heat treating cycles of 72 hr. and longer. There is no doubt that shorter annealing cycles have been and are being utilized in order to keep apace with production demands. However, little mention of them has been made.

Metallurgically speaking, malleable iron is composed of small nodules of temper carbon imbedded in a matrix of ferrite, and to arrive at this condition, white cast iron is annealed so as to cause cementite to break down into these two constituents. The extensive heat treating cycles thus required in the production of malleable iron arises from the slow transformation rate in converting combined carbon to temper carbon. The composition of the iron is of primary importance only so far as to the obtaining of a white cast iron structure in the casting. This is accomplished by adjusting the amounts of carbon and silicon in the melt, thus enabling the founder to secure the desired structure in castings of either heavy or light section.

Compared to the straight malleables, pearlitic malleable irons (so termed due to the fact that the matrix of the iron contains combined carbon rather than free ferrite) have greater strength at the sacrifice of ductility. There is some indication, however, that pearlitic malleables can be made with comparable ductility to that of the straight malleables if the pearlite matrix is converted to spheroidized cementite. This latter type of pearlitic malleable offers interesting possibilities, due to the reduction in the heat treating time which may be realized.

White cast iron after pouring is in an extremely brittle condition caused by the presence of free cementite imbedded in a pearlitic matrix. Since both these constituents contain combined carbon, one as free cementite and the other as pearlite-cementite, two different steps in the heat treating cycle are required to obtain a softer, more ductile condition. The first step embraces the transformation of free cementite which is accomplished at a temperature above

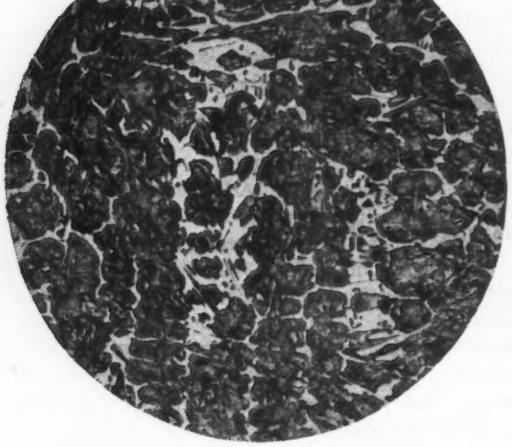

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FIG. 1—Photomicrograph of the structure of white cast iron prior to heat treatment. Free cementite is represented by the white areas in a gray background of pearlite. Brinnell hardness — 372. (Etched in nital, X100.)

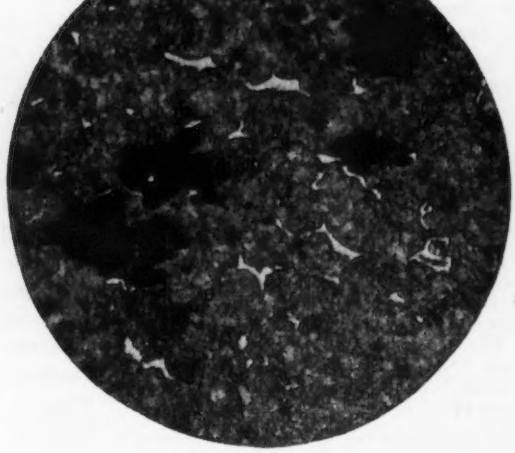

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FIG. 2—Showing structure after 5 hr. of heating at 1650 deg. F. Brinell hardness — 283. (Etched in nital, X100).)

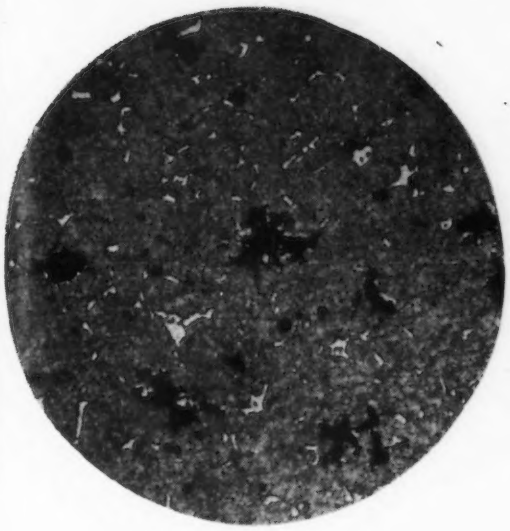

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FIG. 3—After 10 hr. of the heating cycle, most of the free cementite has been decomposed. Black areas represent developing temper carbon. Brinell hardness — 283. (Etched in nital, X100.)

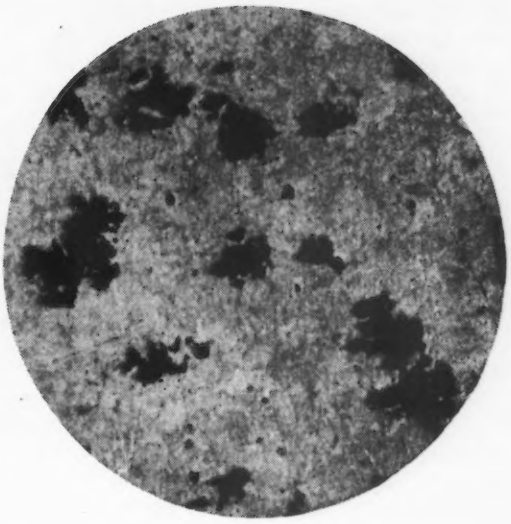

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FIG. 4—After 15 hr. of the heating cycle, the cementite has been completely decomposed. Brinell hardness—283. (Etched in nital, X100.)

the $A_{1,3}$ (1333 deg. F.) line. The second step, transforming pearlite to a softer condition, must be carried on at some temperature below the critical. By determining the time required to break down the massive cementite, one phase of the annealing cycle is established. The remaining carbon, which is in the form of pearlite, must then be converted to a spheroidized condition, affording maximum ductility for a given carbon content.

Breakdown Time

A series of experiments were conducted to ascertain the breakdown time of the cementite in a sample of white cast iron of the following composition: Carbon 2.52 per cent, silicon 1.17 per cent and manganese 0.37 per cent. The microstructure of this iron prior to heat treatment is shown at a magnification of 100 diameters in the photomicrograph, Fig. 1. The white areas in this photomicrograph represent free cementite, whereas the grayish appearing background is composed of pearlite. This sample is representative of the structure of the iron when cast in designs of ¼ in. cross section.

Small laboratory samples of this white cast iron were subjected to a temperature of 1650 deg F. for increasing lengths of time and then air cooled. Microsections were then prepared on samples so treated, so as to determine the time necessary to completely eliminate the free cementite. Hardness determinations were also made to obtain an indication of the ductility. Fig. 2 shows the nature of the structure after 5 hr. at 1650 deg. F. and by comparing with Fig. 3, showing the microstructure of a sample held for 10 hr. at 1650 deg. F. it may be seen that the greatest majority of the free cementite is decomposed in the first few hours of the heat treat cycle. The progress of this free cementite decomposition may be observed by noting the amount and size of the white areas. Temper carbon which shows up as black areas in the latter pictures is non-existent in Fig. 1.

After 15 hr. at 1650 deg. F., the cementite has been completely decomposed, as may be noted by the absence of a white constituent in Fig. 4. The experiment was extended to include 20 hr. at 1650 deg. F. in order to determine whether the pearlitic matrix would undergo alteration at this temperature.

As is shown by the photomicrographs, Fig. 5a, b pearlite still comprises the matrix of the iron after such heating.

The above indicates that holding at heat for 15 hr. at 1650 deg. F., a pearlitic malleable could be produced with the material tested. However, as may be seen from the brinell hardness values given, the casting would not have the ductility required of a malleable iron and therefore further heat treating is necessitated.

An experiment was then made to ascertain the length of time required to secure a spheroidized matrix in the

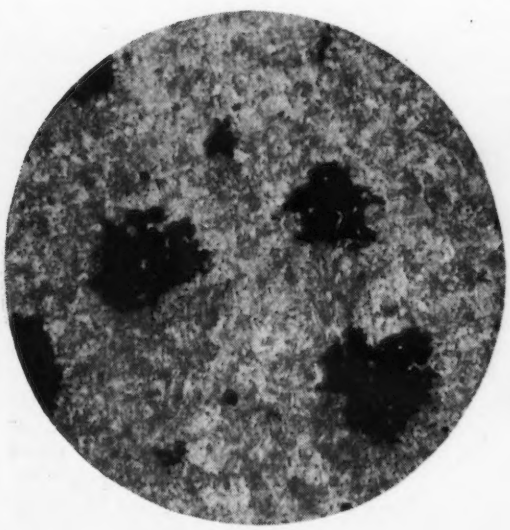

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FIG. 5—(a) Structure of sample after 20 hr. of heating. Etching and magnification same as Figs. 1-4. Brinell hardness is down to 245. Note increase in temper carbon.

(b) Right: Same sample and magnification of 500, etched in picral. Pearlite still comprises the matrix of the iron.

iron. By reheating samples which had been previously graphitized for 15 hr. information concerning the conversion of pearlite-cementite was obtained. Four such samples were given the following heat treatment:

1. Heated to 1250 deg., held for 0 hr.—BHN 228.
2. Heated to 1250 deg., held for 10 hr.—BHN 190.
3. Heated to 1250 deg., held for 15 hr.—BHN 169.
4. Heated to 1250 deg., held for 20 hr.—BHN 156.

Lower Ductility

Results of this experiment indicate that by holding the graphitized sample at 1250 deg. F. for 20 hr., a soft condition in the iron is obtained. A cross-section was prepared on this sample and microscope examination disclosed the nature of the resulting structure. The photomicrograph, Fig. 6, showing the structure of the material at 500 magnifications indicates that spheroidization has taken place. The very small dots appearing in this photomicrograph are small spheres of combined carbon imbedded in ferrite. Due to the nature and size of their occurrence, they do not contribute much to the hardness of the surrounding iron. The ductility of such a material is comparable to that of a true malleable, but has been secured with a considearbde saving in time over that required by the malleable. This resulting structure was obtained by holding for 15 hr. at 1650 deg. F. followed by a further heating at 1250 deg. F. for 20 hr., a total time of 35 hr.

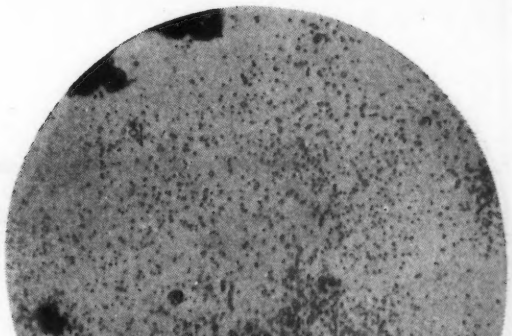


FIG. 6—Structure of iron in which spheroidization has taken place and a soft condition of the iron is obtained. Brinell hardness is down to 156. (Etched in picral, X500.)

Commercially this same result was achieved by heating to 1650 deg. for 15 hr., opening the door and allowing the castings to cool as rapidly as possible to 1250 deg. and holding at this temperature for 20 hr. At the end of this time the castings were removed from the furnace without resorting to slow cooling and a hardness of 149 BHN was secured. The total time involved in the furnace was approximately 48 hr. from start to finish. The difference in time between that necessary for the laboratory experiment and that of the commercial run may be accounted for in the longer heating up and cooling down period required in the larger furnace. The graphitizing operation was handled in a Carborundum muffle furnace. The spheroidizing was done in a car bottom gas under-fired furnace, the parts being packed in pitch coke to lessen scaling.

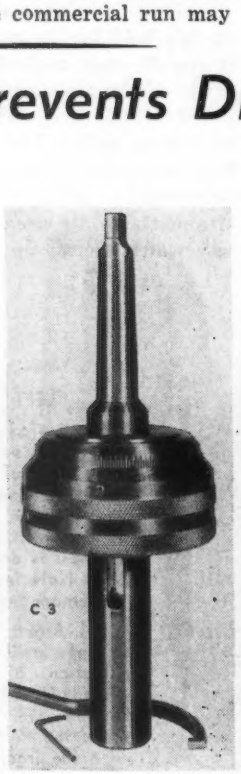
The foregoing experiments indicate that a satisfactory malleable casting can be obtained from white cast iron by holding at 1650 deg. F. for 15 hr., cooling rapidly to 1250 deg. F. and holding for 20 hr., followed by air cooling to room temperature. The resulting material may be considered a spheroidized pearlitic malleable cast iron, which has comparable ductility to that of a true malleable.

Torque Coupling Prevents Drill Breakage

TO facilitate more rapid drilling, reaming, tapping, nut setting and stud driving without danger of breakage, a torque control coupling has been developed by Buffalo Machinery Co., 827-831 Grant Street, Buffalo, N. Y. This device contains a clutch which "throws out" or disengages at a predetermined point in inch or foot-pounds, then reassumes the load when the driving torque returns to normal.

The machine tool type, illustrated, is used for drilling, tapping, nut setting and screw driving operations with full torque control. A similar type with inbuilt self-releasing holder is available for stud driving. In the smallest models a single-plate clutch is used. In the larger models the clutch is of the multiple disk variety. An accuracy of 1½ per cent plus or minus is guaranteed. The coupling is said to require no attention other than routine lubrication.

Using this torque control device, a manufacturer of marine engines reports no drill breakage to speak of on a 10 in. operation which previously had caused continual trouble and reduction of manhours on the job. A diesel engine manufacturer, who had had continued breakage in drilling a 3/16 in. oil lead hole 9 in. deep, reports negligible drill breakage and halving of the drilling time with the use of the torque control coupling. In another plant where wooden conveyors for the Russian Government were being assembled with carriage bolts, some operators set these up so tightly that the washers were compressed deeply into the wood, others so lightly that they shook loose when the wood dried. However, after all nuts were set to a fixed tension with the torque control, the difficulty was completely eliminated. A comparable instance was found in the overdriving of the screws that hold wood planking on small boats. A small torque coupling fixed to a flexible shaft which held the screw driver corrected this situation.



TORQUE control coupling with standard drill shank may be preset to disengage the clutch at a predetermined torque, thus preventing drill breakage.

Pickling Eliminated by Continuous Salt Bath Anneal

FULL annealing of brass cartridge cases on a continuous production heat treating basis is being accomplished with what are said to be the longest continuous conveyor-type salt bath furnaces in operation in America, and with an absence of oxidation. The cases come out of the heat treatment clean and bright and without the slightest trace of oxidation, so that pickling or other cleaning is not required following the anneal.

Two Upton electric salt bath furnaces are employed, each capable of annealing 6000 lb. of brass every hour. One gives the cases a full anneal at 980 deg. F., before the nosing operation; the second furnace, after the nosing operation.

Each of the two furnaces replaces 10 individual non-continuous duty furnaces previously used and are said to have paid for themselves in the first three weeks of operation.

Cases from the previous operation are lowered into the molten salt at one end of the furnace pot and moved along through the molten salt at a rate of 60 ft. per min. A turn-around area at the opposite end permits the conveyor to bring the cases back through the pot for the additional time required for the full anneal. Three shell cases are suspended from each hanger of the conveyor.

The annealing operation is entirely automatic, with the exception of the occasional shovel full of salt required to replenish the salt lost through normal operation. The temperature of the bath is held within ±5 deg. F. by automatic electric temperature control and signal alarm should the range be exceeded.

The first furnace to be installed was equipped with removable covers with the idea that sufficient heat would be radiated from the salt to make them advisable. Salt is added through a small door in the covers at the turn-around end of the furnace. This furnace has been in continuous operation for 18 months and has been shut down only twice during that time for cleaning. The previous equipment required shut-down for complete cleaning every week.

The second furnace to be installed is not equipped with covers since it has been found that the amount of heat lost is small. This furnace is placed on the floor, in contrast to the first, enclosed furnace which was installed with its base approximately 3 ft. above the floor.

Uniform temperature throughout the entire bath is made possible largely through the placement of electrodes which enter the sides of the furnace instead of being thrust in from above surface of the salt. These electrodes are so positioned that the transfer of current through the salt generates the heat at the bottom of the pot. The result is that a normal flow of heated salt circulates upwards by connection, thereby heating the entire contents of the bath evenly and uniformly. Electrodes of this type, which are not exposed to the combined action of salt and oxygen, appear to be capable of lasting almost indefinitely, since in the 18 months of continuous operation, no replacements have been required.

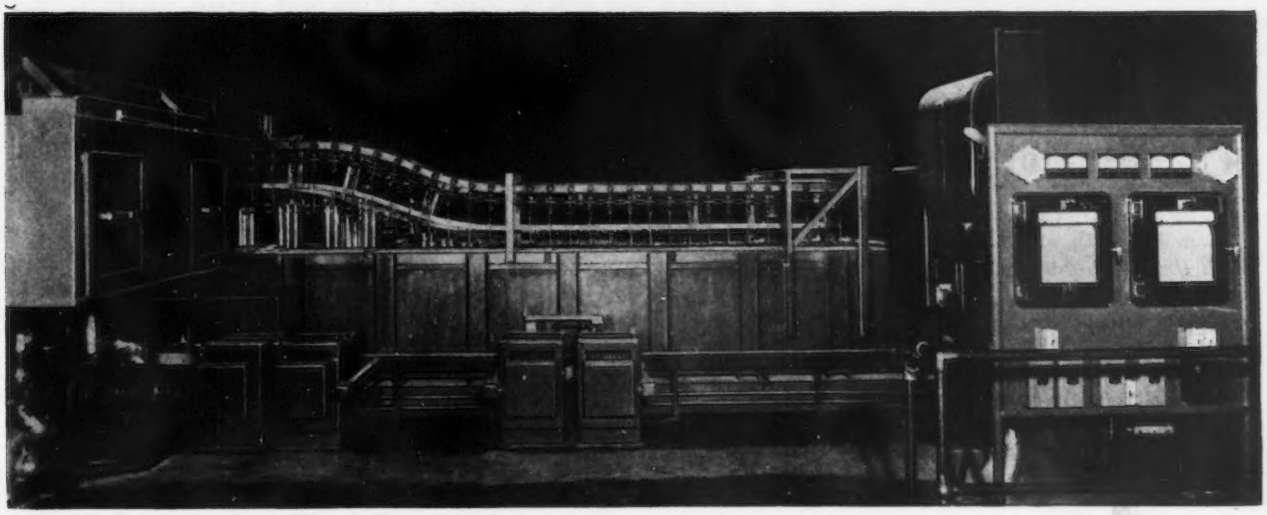
An additional advantage of this electrode design in conjunction with the full ceramic pot permits the use of ordinary commercial nitrate salts, further reducing heat treating costs. Moreover, only 20 per cent of the volume of salt used previously by the individual furnaces is now required for the new, continuous bright anneal furnaces.

o o o

THE first electric salt bath furnace installed to produce a full bright anneal on cartridge cases has removable covers to reduce heat losses. Cases transported by the overhead conveyor enter the salt bath at the opposite end, turn around at the near end and are kept immersed until lifted out at the opposite end. The small door in the end of furnace cover is for replenishing salt.

o o o

SIDE view of second Upton electric salt bath furnace. Temperature control panel at right holds the temperature of the salt to within ±5 deg. F., with any variation beyond these limits causing the horns, also seen on the panel, to warn the operator.

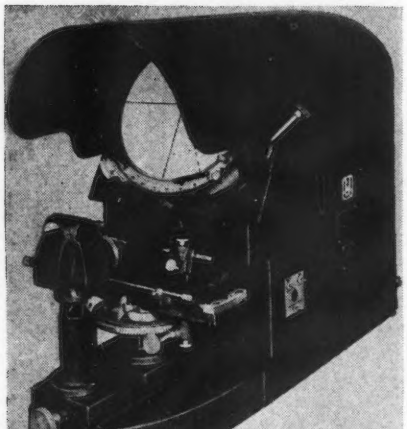


New Equipment . . .

Small Tools and Gages

. . . Recent developments in precision measuring instruments are primarily of the comparator type.

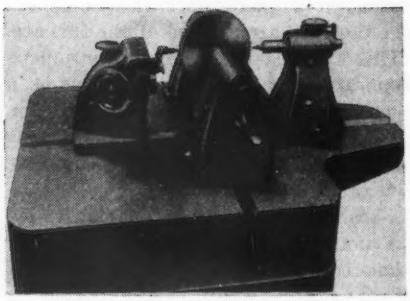
A 14 in. universal bench optical comparator and measuring machine has been announced by *Jones & Lamson Machine Co.*, Springfield, Vt. The comparator has a table 16 in. long that allows measurements of lead and spacing up to 2 in. A handwheel graduated in 0.0001 in. operates on a hardened and ground thread spindle for making vertical measurements up to 1¾ in. On one end of the table is a vernier segment with provision for compounding the table 15 deg. either side of center, for projecting hobs, worms and threads normal to their helix angle. An angle



measuring attachment is provided for measuring angles in degrees and minutes. Centers are available for staging objects up to 3 in. in diameter by 11 in. long.

Gear Checker

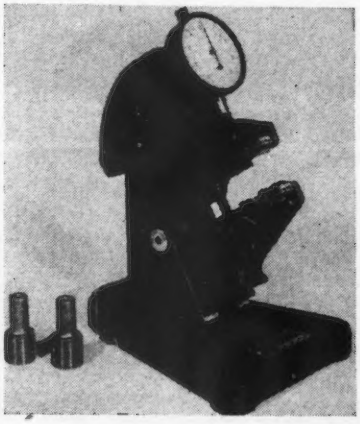
A DEVICE for checking spur gears for eccentricity and tooth parallelism has been announced by *National Broach & Machine Co.*, Detroit. It is furnished in three sizes, for maximum pitch diameters up to 12, 18 or 24 in. It is also available in special bed lengths for gears with integral shafts. It consists of a rigid base with a top finished to the tolerance of a toolmaker's flat and having two keyways crossing at 90 deg.,



one for the adjustable work holding centers and the other for the checking heads, one checking head on either side of the work gear.

Roll Thread Comparator

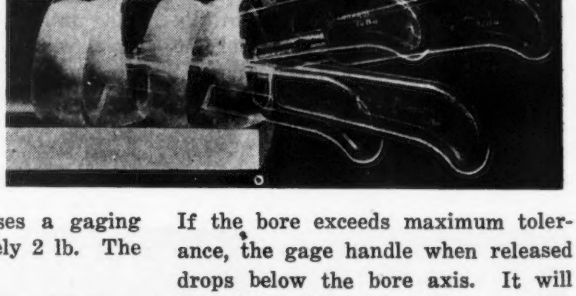
A ROLL thread comparator with pressure control has been announced by *Pratt & Whitney, Div. of Niles-Bement-Pond Co.*, West Hartford, Conn. As work passes between the "Go" rolls, any movement of the indicator pointer means an oversize thread. If the thread is correct, the pointer moves as the work contacts the "Not Go" rolls. Lack of movement at the "Not Go" rolls means undersized work. The gage is adjustable over a range from ¼ to 1½ in. in diameter and uses a gaging pressure of approximately 2 lb. The



indicator graduations are 0.0001 in. which permit the gage to be used for classifying if desired.

Spherical Bore Gage

A GAGE with a spherical gaging head and an adjustable maximum tolerance inset, the TeBo gage, is being made by *Standard Gage Co., Inc.*, Poughkeepsie, N. Y., under license. The spherical head contributes to frictionless operation and effortless insertion and withdrawal of the gaging head when checking bores. It eliminates the possibility of the gage becoming jammed within the bore and provides a simple operating technique not possible with other types of gages. When a bore being gaged is between minimum and maximum tolerances, the TeBo gage head enters freely and may be rocked on its horizontal axis until stopped by contact of the projection with the bore wall, as shown in the phantom view.



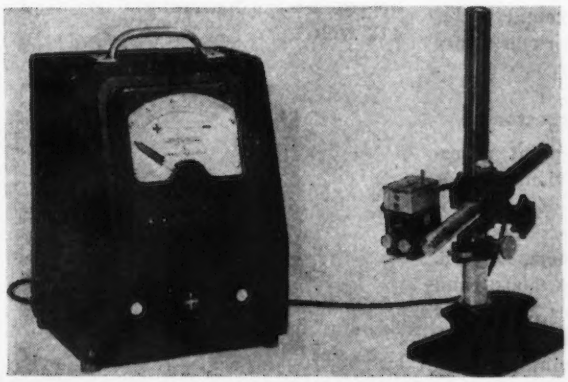
If the bore exceeds maximum tolerance, the gage handle when released drops below the bore axis. It will also drop when the gage encounters at any station such irregularities as out-of-roundness, taper, belling, ovalness or even faulty finish. On the periphery of the spherical head is a smaller projection which is also a part of a true sphere. This projection may be adjusted to the limit of maximum tolerance or to compensate for wear. The gaging head has a protective plating of hard chromium. This, together with the design, results in extremely long gage life. It is said that records of 50,000 gagings are on file.

Piston Ring Inspector

FOR automatically inspecting the trueness of periphery within a tolerance of 0.0001 in. and the width of gap of a specific size of piston ring, an electronic piston ring inspector has been developed by *Sheffield Corp.*, Dayton. As the ring revolves, one beam of light is projected on the periphery of the piston ring. Should the periphery be within tolerance limits, a green signal will flash on at the end of one complete revolution provided the width of gap is also within tolerance or a yellow signal will show if the gap is undersized. Another beam of light scans the width of gap, the photo-electric cell being set to actuate a yellow signal should the gap be undersized. A third beam of light energizes another photo-electric cell set to eliminate the red rejection signal should the width of the gap be oversized.

Height Gage

A REVERSING head feature has been added to its Electrolimit height gage by *Pratt & Whitney Division, Niles-Bement-Pond Co.*, West Hartford, Conn. The improved head carries a small lever which permits setting the gage for measuring either up or down. The gage is furnished complete with indicator and either of the two stands or the head alone is available. All coils and parts are supplied by General Electric.

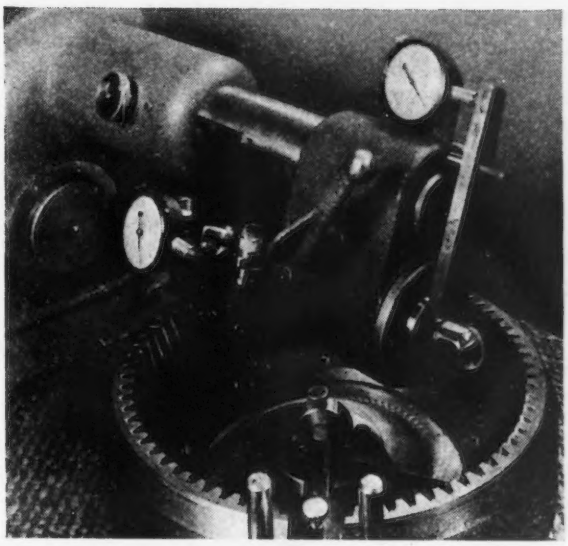


Gage Lubricant

TO prevent the sticking of gages overworked when gaging with plug, ring, snap or thread gages, a gage lubricant has been announced by *Chicago Mfg. & Distributing Co.*, 1928 West 46th Street, Chicago. The lubricant, it is claimed, can also be used as a rust preventive. A wiping film of oil is said to last from 1 to 2 hr. on any size gage.

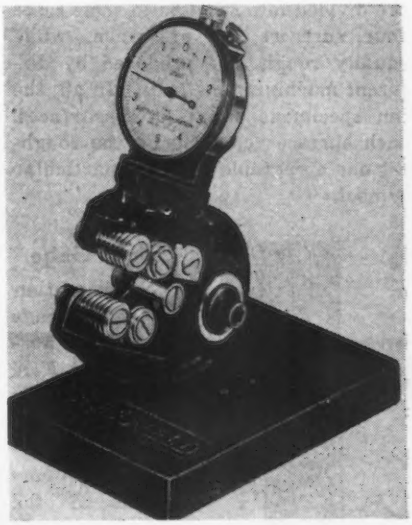
Gear Checker

FOR checking tooth spacing, eccentricity, pitch diameter and root diameter of spur or helical gears from 3 to 64 diametral pitch and from 2 to 18 in. pitch diameter, an internal gear checker has been developed by *National Broach & Machine Co.*, Detroit. Eccentricity and index can be checked at the same time. The pitch diameter is checked by comparison with a gear of known size. With an auxiliary head, the parallelism of spur gear teeth can also be checked.



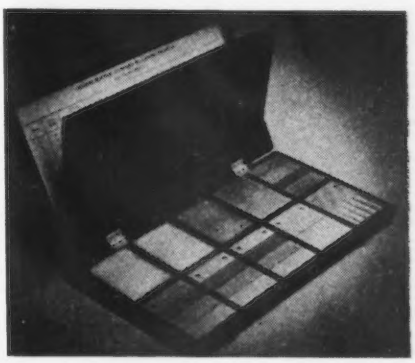
Precision Instrument

A PRECISION thread checking instrument which combines the design principles of the indicator snap and thread roll-snap gage but which can be used to check to closer limits than is possible with the thread roll-snap gage has been announced by *Sheffield Corp.*, Dayton. The Thredchek can be placed in the standard thread roll-snap stand and used at the bench for checking of production parts or can be used as a hand gage or in the machine to make sure that the proper thread is being produced. Also it may be used as an accessory to the visual gage.

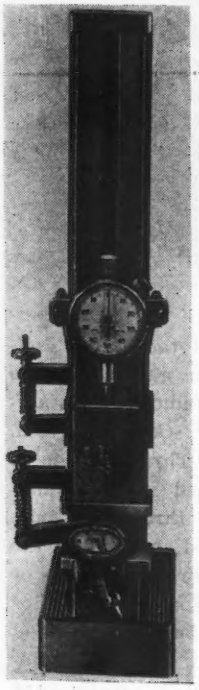


Surface Roughness Specimens

A SET of standard surface roughness specimens each representing one clearly identified degree of surface roughness ranging from the smoothness of a bearing surface to the roughness of a flame cut has been announced by the *General Electric Co.* The set consists of ten metal specimens each approximately 2 x 2½ x ⅛ in. in size. Several of the specimens



are divided into two and in some cases four surfaces, all of which, while equally rough, are produced by different machining methods. In all, the ten specimens simulate 25 surfaces, each surface representing the roughest one acceptable for that particular symbol.

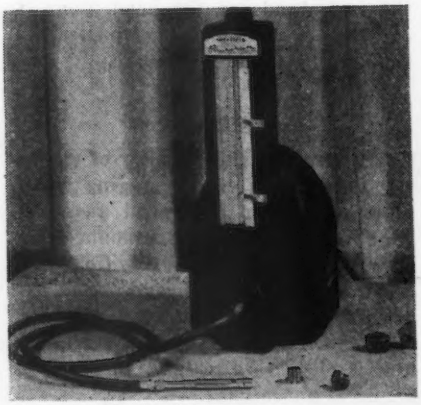


Height Gage

AN inspection height gage has been announced by *F & H Mfg. Co.*, 10338 Gratiot Avenue, Detroit. To determine the correctness of the finished work, it is only necessary to lower the platform to the bottom of the gage column, then set the correct gage block on the platform and adjust the top indicator to a zero reading on the gage block and proceed with the inspection by setting the piece to be inspected on the platform and checking the reading of the upper indicator.

Magnetic Indicator Base

A SUPER power magnetic indicator base has been announced by *Main Electric Co., Inc.*, Rochester 2, N. Y. The use of the new unit is said to eliminate the need of any clamp and permit easy access to places that would be impossible to reach with other types of bases. Composed of two powerful Alnico magnets, the indicator will hold tightly to iron or steel surfaces. Magnetic charge is guaranteed to remain at full strength for five years, or the base will be recharged.



Air Gage

AN unusually high amplification Precisionaire has been developed by *Sheffield Corp.*, Dayton. The improved gage provides an amplification of 20,000 to 25,000 to 1 (a spread of 2 to 2½ in. per 0.0001 in.) on internal measuring and is graduated in 0.000005 in. increments. In the new model, action of the floating indicator is just as quick and stable as on other lower magnification models. The base instrument has the same general appearance but has been modified with specially built high precision metering components.

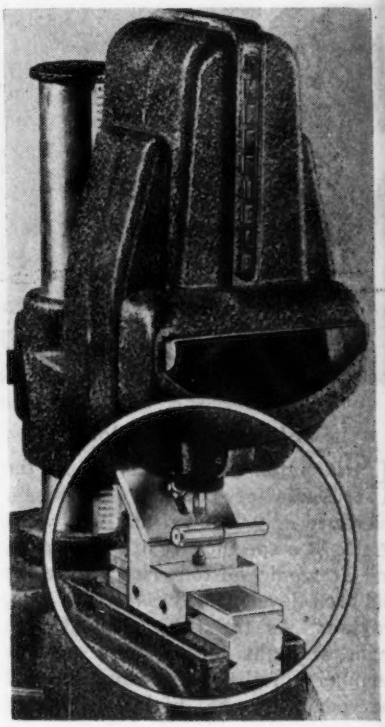
Surface Plate

A ROUND surface plate which measures 102 in. in diameter and was built primarily for checking gun turrets has been announced by *Machine Products Corp.*, Detroit 12.

The plate weighs 2½-ton and is approximately 18½ in. in depth. An advantage in working on round plates is the fact that the work is more accessible from all sides.

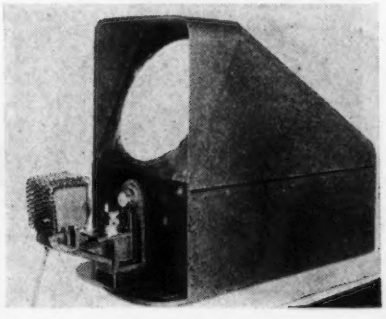
Ball Point Gage Accessory

A STANDARD ball point accessory for Sheffield visual gages for production checking of pitch diameter on threaded parts has been announced by *Sheffield Corp.*, Dayton. It may be used on both 500-1 and 1000-1 models. It includes a chromed bracket and adjustable backstop with a thread checking ball point of tungsten carbide mounted on the bracket and another ball point mounted in the visual gage spindle. The accessory has a capacity of 1 in. maximum work diameter and is set up with threaded masters instead of gage blocks. Threaded parts ranging from 11 to 56 threads per in. and up to 1 in. in nominal size can be checked.

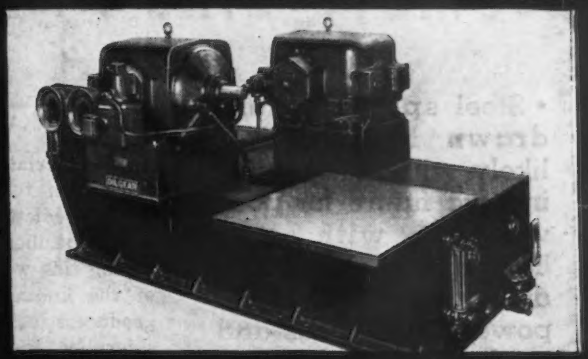


Optical Projector

A BENCH model P25 optical projector furnished with a standard full size 14½ in. diameter working screen has been announced by the *Portman Optical Co.*, 70 Mill Road, New Rochelle, N. Y. Production speed of inspection is possible simply by using commonplace staging V-blocks or other inexpensive holding fixtures. Stage area of the projector measures 4 x 4 in. The overall length is 42 in. The projector can be furnished with a choice of a 10X, 25X, 50X or 90X magnification lens unit and can be operated on ordinary light circuits of 110 volt.



Economical Oilgear Radial Rolling Piston power units are used to charge stationary and portable catapult power plants to catapult planes at flying speeds in something over 100 feet. Besides high linear speed obtainable over a wide range, acceleration and/or deceleration are controlled, power can be stored during idle period.



FROM ZERO TO FLYING SPEED IN A MATTER OF SECONDS

ARE YOU TRYING TO:

1. Apply large forces through long... or short... strokes at variable speeds?
2. Obtain automatic work cycles, variable speeds in either direction... with or without preset time dwell?
3. Apply large forces through continuous or intermittent reciprocating cycles at constant or variable velocities?
4. Obtain extremely accurate control of either position or speed of a reciprocating member?
5. Apply accurately variable pressure either static or in motion?
6. Closely synchronize various motions, operations or functions?
7. Apply light... or heavy ... forces at extremely high velocities through either long or short distances of travel?
8. Obtain continuous automatic reversing drives at constant R.P.M. or over a wide range of speed variation?
9. Obtain accurate remote control of speed and direction of rotation, rates of acceleration and/or deceleration?
10. Obtain constant horsepower output through all or part of a speed range?
11. Obtain automatic torque control?
12. Obtain accurately matched speed of various rotating elements?
13. Obtain constant speed output from a variable speed input?
14. Obtain full preset automatic control, elimination of problems of shock, vibration, etc.?

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There is hardly any limit to the applicability of Oilgear Fluid Power. In catapulting heavy airplanes from the decks of carrier escorts, Oilgear not only furnishes the tremendous power required to accelerate the load from zero to flying speed in a few seconds but it accumulates this power with comparatively small, standard units while each plane is being maneuvered into position. *You* can use units of this type on other installations where tremendous power or high velocity is required intermittently, as in die casting machines, braiding and knitting machines, riveting presses, etc. Or if your machine power or transmission requirements lie far afield, they are almost certain to be met... better, more economically... in any of the scores of other functions Oilgear Fluid Power provides. Just as war industry built upon peacetime knowledge, so today shrewd designers are adopting the lessons learned in war. Put *your* problem up to Oilgear engineers; see if their solution isn't what you've been looking for. Do it *now*... THE OILGEAR COMPANY, 1303 West Bruce Street, Milwaukee 4, Wisconsin.

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Fluid Power

Assembly Line . . .

STANLEY H. BRAMS

• Steel specifications drawn by the SAE likely will be modified in near future for postwar use, with some lightening of alloys indicated . . . Two-engine powering of buses and trucks discussed at engineers' conclave.

DETROIT—Sessions of the annual meeting of the Society of Automotive Engineers, which concluded late last week here, provided more concrete news of developments in progress and in forecast than for several years. Outlooks in directions all the way from steel to upholstery were presented.

For laboratory men, there was considerable interest in the declaration by J. H. Hunt, director of the new devices section of General Motors Corp., that SAE standards will be considerably increased in the early postwar period, although they will follow the same general lines as present, with the increases provided to deal with postwar conditions such as new materials and processes which have been found workable.

He predicted an early revision of SAE specifications on many steels, saying this would come about because of the finding during the war that producers can get along with considerably leaner alloys than they worked with in prewar days. However, he anticipated that most of the NE grades of steel would disappear in favor of the old SAE specifications which prevailed in the days of freer ferro alloys.

The speaker did not anticipate that there would be any swing, as predicted in some quarters, from SAE specifications to AMS specifications, even though the latter contain much more information. Hunt stated that a recent canvass of opinion in a group of automobile company metallurgists, most of whom have had experience with AMS specifications in war work, showed that a very great majority are opposed to any such idea as one likely to increase overall costs without compensating advantages. He predicted continued cooperation between the steel and the automobile industries in developing improved practices, and stated that the organization of the new Iron and Steel Division panels, with representation from both industries, provides a most effective way of dealing with the problems expected to arise. One of the first such problems, as example, involves the application of hardenability specifications, on which a joint report has recently been issued by the AISI and the SAE. Concluding, Hunt predicted future activity in developing standards for synthetic rubbers, for shot peening, for higher premium fuels, for superior lubricants, and for other materials.

One of the interesting features of the convention was a survey conducted by four large newspapers in as many geographical areas among car owners and prospective buyers, seeking to analyze their choices and preferences. No particular trend was notable as to any change in body size, with about as many favoring a longer wheelbase as asked for closer coupled bodies. Four-door sedans were generally favored, with five-passenger coupes close behind. Indicative of possible minor reduction in automotive sheet requirements during postwar—should the preference be carried out—was a generally expressed desire for larger windows and better vision; improved ventilation was also wanted by a majority. But the cars of tomorrow, if the customers have their way, will not become squattier—there was a decided feeling against reducing headroom to achieve more rakish lines. There seemed to be no general desire to add on equipment extras and thereby increase the cost delivered of the car, but about a third of those answering one of the surveys indicated they so liked the idea of equipment to provide summertime cooling that they would be willing to pay well to get it.

Declaration that higher horsepower and higher acceleration and performance represent "musts" in the motor buses of the future was made by F. R. Fageol, president of Twin Coach Co. To this end he stressed the ad-

BIGGEST BOMBER: *New engines, turbo superchargers and reversible pitch propellers have been installed on the XB-19A, the world's largest experimental bomber, a job started by the Fisher Body Div. of General Motors at Romulus Army Air Field, Detroit, and completed at the Fisher Cleveland Aircraft plant. The four Allison engines, each producing 2,600 hp., increased previous power by approximately 30 per cent, and the turbo superchargers raise the effective ceiling considerably. The huge bomber is built to carry an 18 ton bomb load or 124 fully-armed men. While the job was at Romulus, sharp-eyed passersby knew something was afoot, because the huge 3-story tail of the ship could be clearly seen above the hangar buildings from nearby roads.*

Up from the Drawing Boards

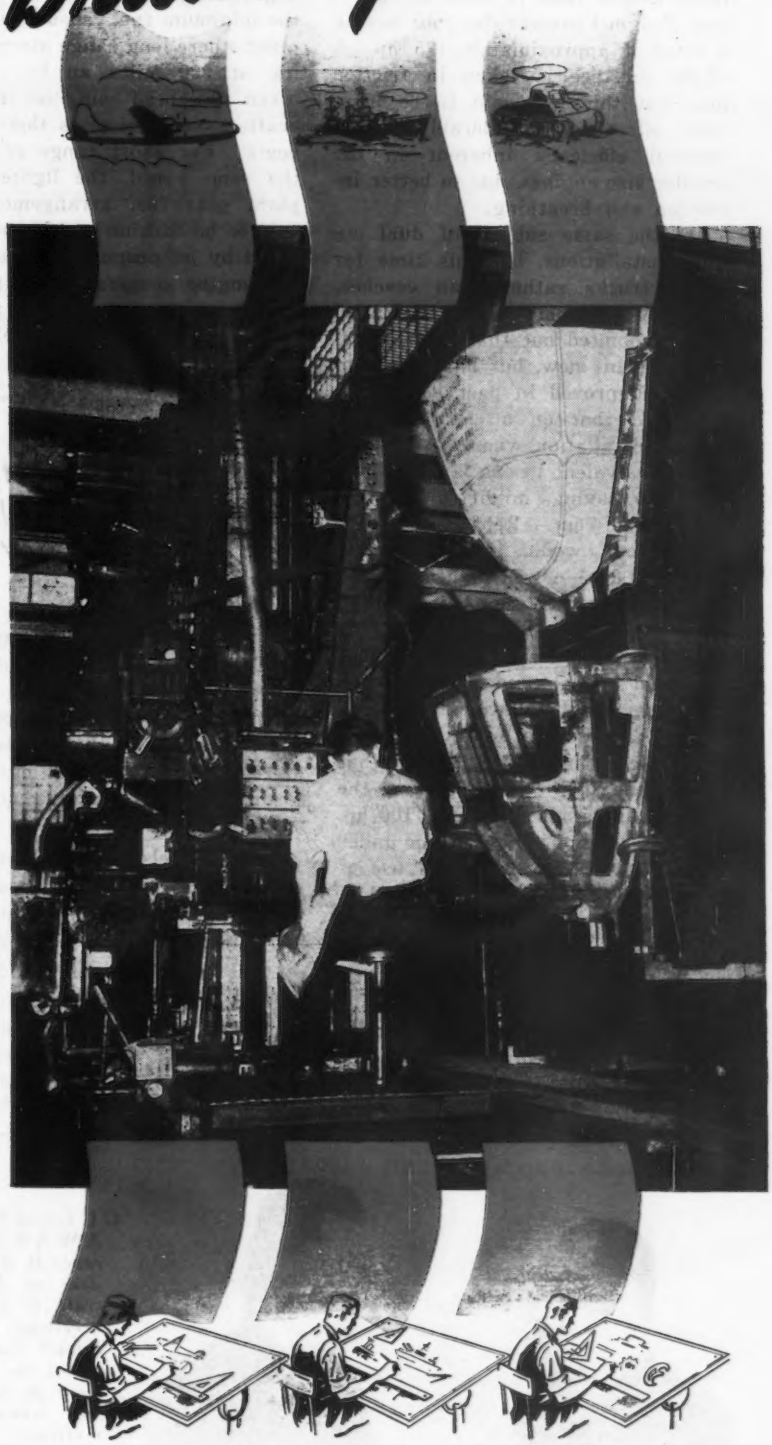
he P&W Keller is proving in-aluable in turning out parts nd pilot models for new nd vital war equipment.

gger, more powerful airplanes, new inven-ons, changes in design, advanced models . all of these are flowing daily from Amer-a's drawing boards into experimental models d actual production lines.

Bridging the gap in thousands of instances the Pratt & Whitney Keller machine . . . e "machine with a brain" which transforms ooden or plaster models into finished steel perimental parts with speed, economy, and ccuracy.

The Keller can make up any shaped part ithin a range of 2.5′ x 6′ x 12′ out of a plain ab of steel or Duralumin or similar metals. can work in two or three dimensions. It de-steps costly tooling, expensive dies. ost important, it hastens the arrival on the ghting fronts of new and vital equipment hich can help shorten the war.

Built with the precision for which Pratt & hitney is famous, the Keller has an in-erent long life and dependability. And it is qually at home turning out the products f peace . . . no conversion one way or the ther. Full particulars on the scope and ersatility of the Keller will be mailed upon equest.



PRATT & WHITNEY

Division Niles-Bement-Pond Company

WEST HARTFORD 1 • CONNECTICUT

vantages of two engine installations in place of one, as now available in Twin coaches. Such units, he said, provide over 300 net hp. without any more weight than is required in the best designed present day jobs having a total of approximately 175 hp. A slight sacrifice is taken in friction loss, but this was said to be more than offset by considerably higher thermal efficiency inherent in the smaller size engines, due to better induction and breathing.

On the same subject of dual engine installations, but this time for motor trucks rather than coaches, Ralph M. Werner of United Parcel Service pointed out that this idea is by no means new, but has been constantly improved in past years. He estimated that on a complete two-engine installation whose power output is equivalent to one larger power plant job, savings might run as high as 50 per cent. Repair costs, he pointed out, would be considerably less with dual power plant arrangements than in the case of single units twice their size. He figured that weight savings of approximately 1000 lb. would be achieved by using two 100 hp. engine installations in a truck rather than one 200 hp. unit. As for fuel consumption, he pointed out that the specific fuel consumption of the 200 hp. engine and individual 100 hp. engine is substantially the same under full load; but at partial load, use of one of the dual engines rather than both would reap real economy benefits.

Another interesting discussion of power plants, from an entirely different standpoint, was that presented by C. F. Bachle, vice-president in charge of engineering of Continental Aviation & Engineering Corp., who outlined the possibilities and advantages of compounding turbine power with a reciprocating piston engine. He stated that the gasoline piston engine compounded with turbine offers the minimum fuel consumption power plant where long range aircraft cruising at 300 miles an hr.—which is about the speed being set up by aircraft makers today as their postwar bogie. For short range cruising at the same speed, the lightest power plant plus fuel arrangements were said to be turbine and propeller, followed by jet propulsion, gasoline piston engine compound and propeller, gasoline piston engine and propeller, and diesel engine and propeller.

Present-day problems brought abo by long term ownership of passeng cars were discussed by John Oswa of General Motors Corp. He indica ed that the very considerable amou of corrosion on aged car bodies is subject of considerable investigati at this time, and he predicted th better protection would be provid in the future for both exposed a unexposed surfaces on automobil This speaker made some good new paper copy by assailing "the sho comings of chromium plated part and predicting that most auto make will provide future owners with pla ing of better quality and increas durability.

1941 Appliance Output Level to Be Reached One Year From V-E Day

Chicago

• • • **Production of home** appliances by Edison General Electric Appliance Co. will be resumed within three to six months after the European war, but full output at 1941 levels will require from seven to 12 months, according to Ward Shafer, general sales manager.

First models resumed essentially will duplicate those produced in 1942 with the exception of chrome trim and elimination of war finishes used at that time. Speculation that new designs would appear soon after the start of production was quashed, with indication that wartime developments might not be incorporated for more than a year. Expectation was voic that early post-European war pric would be set by OPA, probably 1942 levels with little likelihood exceptions being made. The compa plans to introduce home freezers a automatic cycle home washers to co plement appliances now being pr duced under the Hotpoint label.

General Motors Steps Up Shell Productio

Detroit

• • • **General Motors Corp.** is acce erating shell production in plants a across the country.

Chevrolet Division has just beg a 155 mm. program at St. Loui Fisher Body Division has a 155 m program under way at its Grand Ra ids Stamping Division; Oldsmobi Division is producing various sizes shells at Janesville, Wis., Kansas Cit Mo., and Lansing, Mich.; and the Po tiac Division 155 mm. shell progra has been operative since Septemb

With December output at the Che rolet St. Louis plant triple origin estimates, output of these shells expected to reach hundreds of tho sands of units monthly early this ye At Fisher Body, output will be i creased 150 per cent over prese schedules by February. Oldsmob has scheduled a 25 per cent i crease in its first quarter schedule, compared with the last 1944 quart Pontiac's program is reaching t level this month and proposes to i crease the going contract by 25 p cent if the Army so desires. Th plant has also signed a new contra to build navy rockets.

o o o

GUGGENHEIM AWARD: *Lawrence D. Bell, president of Bell Aircraft, is shown receiving the* 1944 *Daniel Guggenheim award for achievement in the design and production of military aircraft, from Mac Short, past president of the Society of Automotive Engineers. The award was made in connection with the SAE's annual meeting in Detroit.*

o o o

Only Carpenter offers this 3-Way Program...

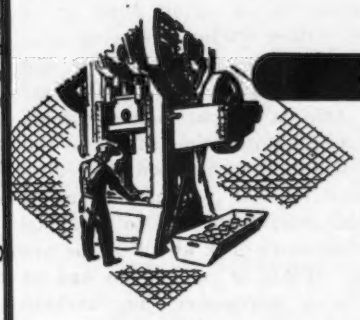
to reduce unit costs by better tooling

SAFER METHOD OF SELECTION.....

A method of tool steel selection that reduces inventories and guides you to the tool steel that will give you maximum tool life for a specific job. Saves tool room time and helps you to plan your tool performance.

BETTER HARDENING RESULTS.....

Definite help in overcoming hardening troubles, cracking, size change, distortion, and premature service failures that contribute to excessive tool costs and production holdups.



MORE PRODUCTION PER GRIND.....

First aid procedure for curing tool-caused interruptions to machine output. Tools that stay on the job longer between grinds, mean fewer shutdowns and lower unit costs.

Carpenter 3-way program makes it easy to get er tooling *fast*—and bring about savings in tool s and production costs. War plants found this gram a life saver in boosting war output. Now, same program will help to speed reconversion bring needed cost reductions.

SELECTION OF TOOL STEEL ON PERFORMANCE The Carpenter Matched Set Method simplifies selection. It guides you to the proper tool steel for each job—the steel that will give you the ired combination of properties for maximum duction performance.

RECOMMENDED HEAT TREATMENT PROCEDURE Clear, simple, easy-to-follow, printed instructions are provided for heat treating each Carpenter Matched Tool Steel, to get the red results. Proper heat treatment assures safe dening and savings in tool making costs.

CHECK ON TOOL LIFE AND OUTPUT PER GRIND Here is the big opportunity to cut unit costs. Find out which tools and dies need frequent regrinding, or which fail prematurely in service. Carpenter Matched Tool Steels can help you lick this condition, and reduce unit costs.

How to get started on this cost reduction program: Send for the Matched Tool Steel Manual. It explains this time-proven plan in detail—contains heat treating instructions for each steel, and includes an 80-page tool index and steel selector that really simplifies production. Write for a copy today on your company letterhead, stating title or position. (Free to tool steel users in U.S.A.)

THE CARPENTER STEEL COMPANY

121 W. Bern St., Reading, Pennsylvania

Carpenter MATCHED TOOL STEELS

Washington . . . L. W. MOFFETT

• Selective Service drive to secure 255,000 additional infantrymen threatens high steel ingot production loss this year . . . It may be as high as 12,000,000 tons.

WASHINGTON—A 9,000,000 to 12,000,000 ingot ton production loss this year is being predicted by steel officials if Selective Service decides to cancel deferment of the industry's 60,000 26-29ers in its drive to secure 255,000 additional prime infantrymen in the next six months.

This is worrying government men because workers in the 26-29 group furnish the muscle to the more strenuous operations in the industry and are therefore considered the backbone of production.

It is estimated that only 36,000 of the 60,000 workers would pass the stiffer physical requirements and leave the industry with the remaining 40 per cent constituting 4F's.

Manpower officials figure it will be necessary to call up 600,000 of the 26-29ers to get the necessary number of replacements, and manpower officials outside of Selective Service think some way should be devised to insure that no more than the required number of these men are inducted. The reason is that when draft deferments were cancelled a year ago for men in the 18-26 group, an unsuccessful attempt was made to defer 500 essential men in the steel industry.

The alternative to eating into the next age group draft deferments is converting to infantry replacements, Air Corps cadets, mechanics and groundmen, and the Army Specialized Training group, one Selective Service official thinks. However, the War Department thought of this first and transferred about 55,000 Air Corpsmen and 25,000 specialized trainees to the infantry recently amid a storm of protest from relatives and the men themselves.

The size of the two groups is not known by Selective Service, but one SS official said that about one-half of the Air Corps men in this age group could be transferred to infantry and said that the infantry training for these men could be accomplished more quickly than in the case of new recruits. The reason for the surplus men in the Air Corps is that casualties have not been as high as were originally thought, and it is reported that as many as 40 per cent of pilot candidates are being washed out of airtraining schools in furtherance of a policy of restricting the numbers of new pilots because they are not needed.

* * *

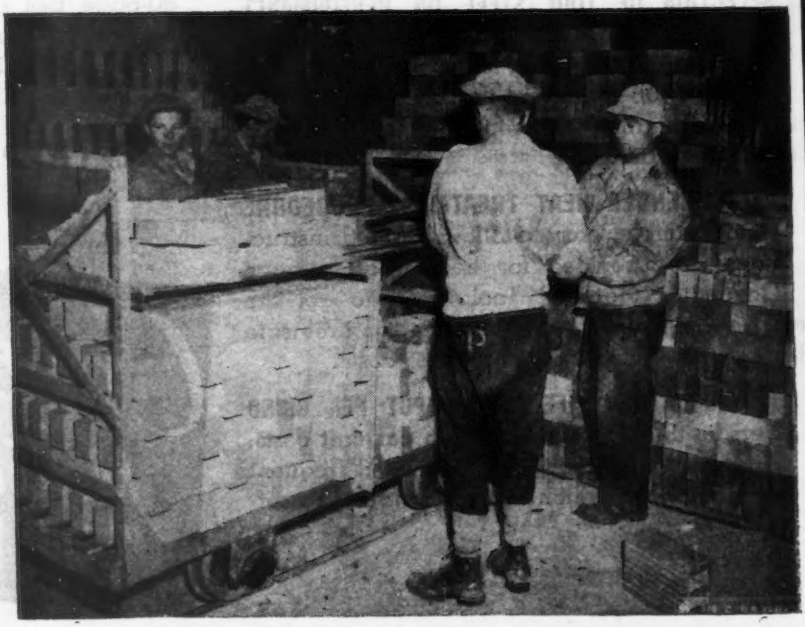
Whether War Mobilizer James F. Byrnes will be able to follow through completely in his new self-assigned job of finding the wherefores of production shortages, getting complete information about war procurement and all phases of production, will depend in a large degree on how much help he gets from industry. Indu try could furnish information an technical assistance.

WPB has gotten to the positio where it no longer trusts the ad quacy of its own estimates of th validity of military requirements, an it seems that OWMR is not satisfie with the work the WMC has done i its field.

In Mr. Byrnes' thorough procure ment review which he proposes, shi utilization will be studied, as well a shipyard inventories and those o Maritime Commission warehouse with a view to determining just wha United States need for further shi construction is after June of thi year. Other studies are being under taken with the same object in mind

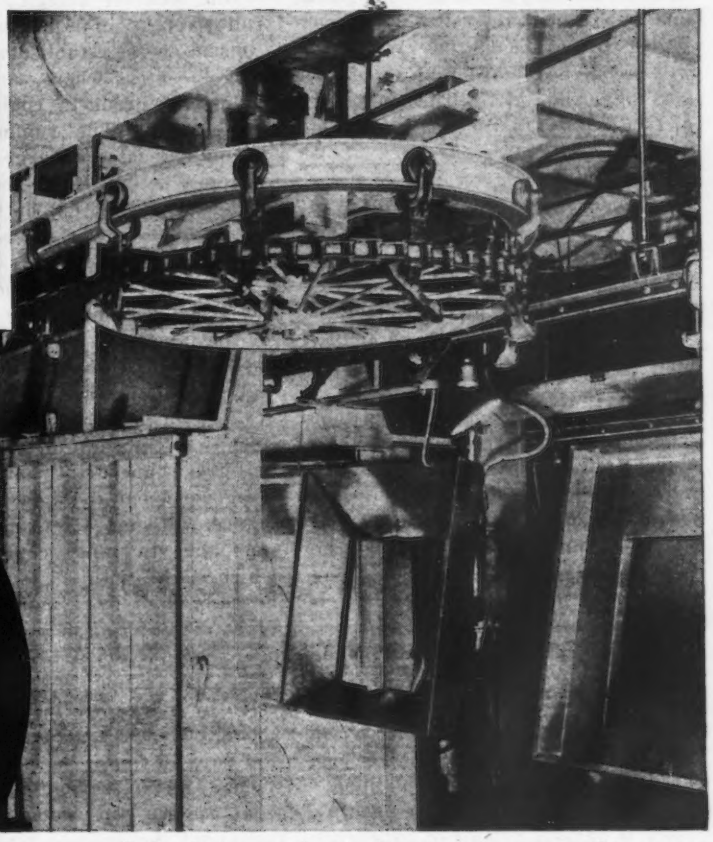
To the casual thinker, it may seem odd that a procurement review i started so long a time after the war' beginning, but the need for concen tration on war production has lef officials very little time to really tak a painstaking look at all of the prob lems. WMC, of course, has had time to do a manpower job, including studies in labor utilization, but many factors have hampered that agency—including a manpower shortage of it

PRISONERS AT WORK—*In an effort to relieve the manpower shortage, German prisoners from Camp Breckenridge, Ky. are working under careful supervision in a brick kiln at a clay products plant in Owensboro, Ky.*



AMERICAN MONORAIL with Infra-Red Ovens CUTS BAKING TIME 70%

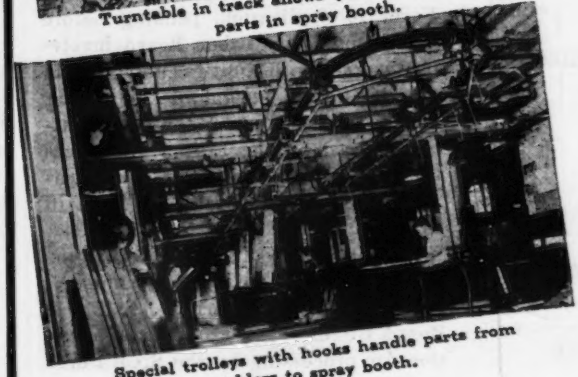
Storage bank on tracks assures supply of parts to sprayer.



Pusher feeds sprayed parts through oven on monorail to wrapper.

$1925. SYSTEM CARRIES PARTS FROM WELDERS THROUGH STORAGE, SPRAY AND OVENS TO WRAPPER

Turntable in track allows quick movement of parts in spray booth.



Special trolleys with hooks handle parts from welders to spray booth.

A well known furnace manufacturer has eliminated the bottle-neck in their enameling section with the use of infra-red drying and American MonoRail Overhead Handling System. Where casing sections would pile up in the spray booth, often requiring over 30 minutes—it now takes only 8½ minutes to bake the finishes.

American MonoRail synchronizes all pre-baking operations with baking time. The system extends from the sheet metal section, through spraying, baking, wrapping and returns to fabricating and welding stations. A turntable in the track permits reversing of carriers holding the pieces so that operator may spray all sides without touching the sprayed surfaces.

Our engineers will gladly show you how your products can be carried at the lowest possible cost and the highest possible efficiency.

THE AMERICAN MONORAIL CO.
10103 ATHENS AVENUE CLEVELAND 7, OHIO

own, and the administration's wavering manpower policies.

This, of course, means that OWMR is going to be more of an operating agency than anyone at first imagined, and is expected to utilize WPB personnel to a great degree. WPB then will become less important as OWMR gets bigger and Mr. Byrnes enters the picture to a greater degree, if and when he does.

* * *

A broad campaign to stimulate interest of businessmen, engineers and the public at large in the special problems of surplus disposal may be launched by DPC and RFC after the end of the European War. A limited campaign will be started almost immediately.

Special sale problems will be items of a military nature for which there is no apparent ready commercial use and industrial products which are in great over-supply.

In steel, an example of a material of military nature for which there will be no quick sale obviously is sheets of deep drawn steel, of special cut, chemistry finish and shape which were produced for use in the making of steel cartridge cases. Since the Army has decreased its use of steel in cartridge cases, it has declared surplus considerable tonnage of this material. An example of oversupply is various grades of expensive tool steel for which there is little present demand because tools themselves are in surplus and promise to be for some time to come.

One idea for bringing to bear the full strength of American ingenuity consists in the establishment of "rummage" centers where various surplus industrial products could be placed on exhibit. The rummage centers would be located in large cities where war production is now located, and a technical description of the material or article would be placed upon samples to be shown.

The object of the rummage centers would be to stimulate the imagination of the layman as well as that of the technical man in devising new and different adaptations and uses of material. Officials think it quite conceivable that the plan will work out to the great mutual advantage of both the government and industry. For instance, odd shaped forgings and castings and stampings could be shown which might, with slight modification, he recognized by a manufacturer as types of material he could efficiently use in his factory.

An illustration of this was provided by a business man who bought about 1,500,000 steel cartridge clips and paid 10 times the scrap price for them. The government couldn't think what use the clips would be commercially, but the business man saw that the clips with slight machining would make excellent can openers. Satisfactory can openers were made from the clips; the business man made a profit; the public was enabled to buy gadgets it had needed for a long time; and the government salvaged 10 times what it would have gotten had the material been sold as scrap.

•

Steel Commission To Pass on Intra-Plant Wage Rate Agreements

Washington

• • • **Giving steel companies** an opportunity to present all pending disputes over adjustment of intra-plant inequities under the standards laid down in the WLB decision of Nov. 25, the WLB ruled on Jan. 10 that companies which had filed Form 10 prior to the Board's decision in the wage case could request regional war labor boards to refer such cases to the new Steel Commission.

Companies are given five days from the receipt of the notice to request reference to the Steel Commission of a pending voluntary application before a regional board if settlement by the regional board would interfere with the guide posts set up in the WLB decision of Nov. 25.

The Steel Commission has not yet been named but will be established soon to see that the limitations and the principles of the Board's order with respect to adjustments necessary to correct intra-plant wage rate inequities are carried out. As provided in the Nov. 25 order, agreements reached under this section of the order will not become effective until approved by the Commission and any disputes on this issue will be referred to the Commission for determination.

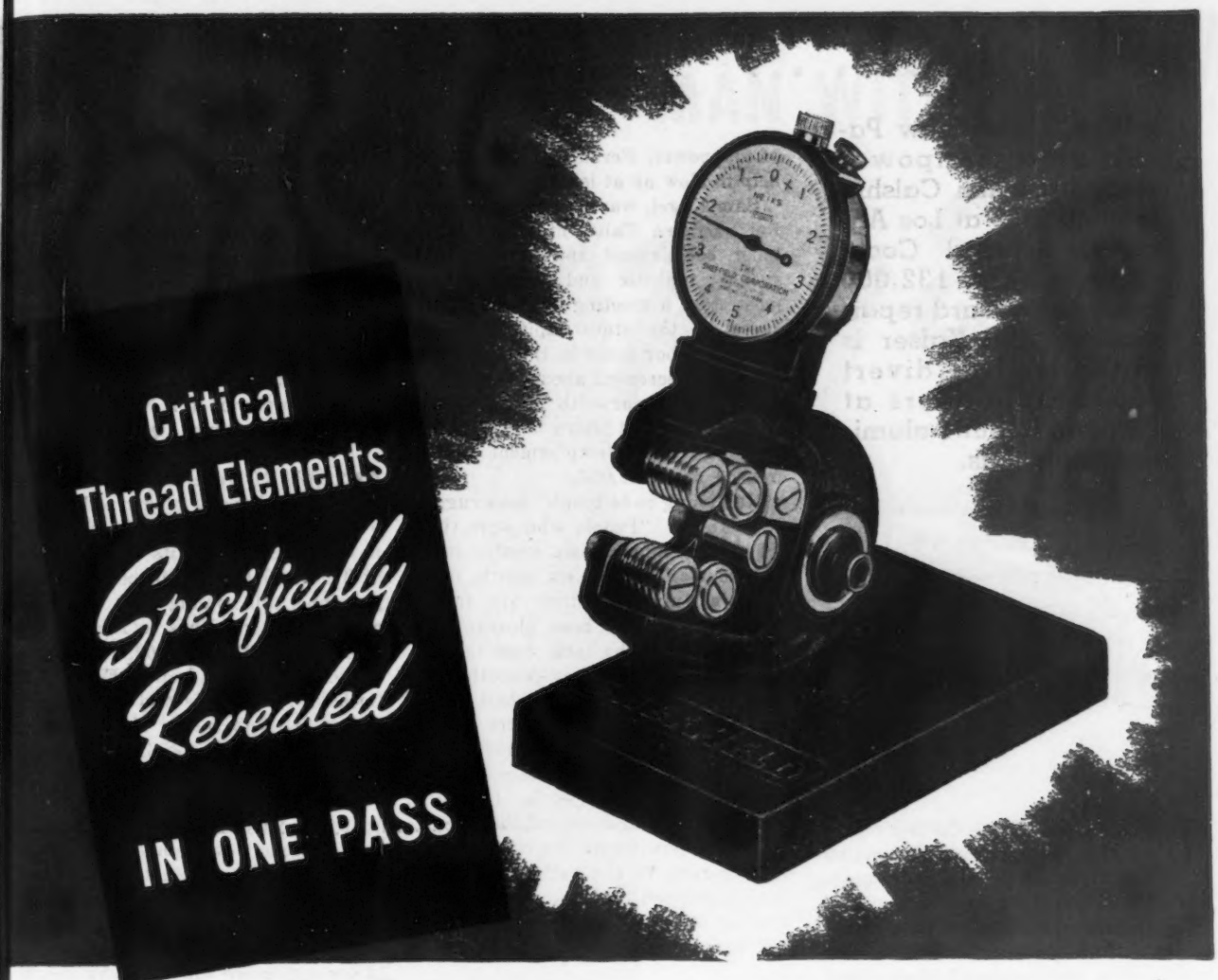
The text of the resolution follows:

"Be it resolved:

"That any party to any existing Form 10 application, pending before a Regional War Labor Board involving wage-rate inequities, may, within five days after receipt of this notice, on the representation that the matter covered by the Form 10 application might interfere with the application of the guide posts set forth in the directive order of Nov. 25, 1944, for the adjustment of wage rate inequities in the basic steel industry, request the appropriate Regional Board to refer the Form 10 application for processing by the Steel Commission."

THE BULL OF THE WOODS — BY J. R. WILLIAMS

DR. JEKYLL AND MR. HYDE! NOW HE'S DR. JEKYLL, FEEDING THE LITTLE BIRDS, AN' FIVE MINUTES AGO HE WAS MR. HYDE, TAKIN' MY HIDE OFF FOR SPOILIN' A JOB!
THAT'S HOW HE SQUARES HIMSELF FER BEIN' HARDBOILED IN THE SHOP! IT'S ALL RIGHT IF WE THINK HE'S A TOUGH GUY, BUT HE HAS TO LIVE WITH HIS BETTER NATURE, TOO!
1-19
J.R.WILLIAMS
THE DOUBLE DEALER
T. M. REG. U. S. PAT. OFF.
COPR. 1945 BY NEA SERVICE, INC.



The Sheffield **THREDCHEK** provides a more *specific* and *accurate* check of critical thread elements than the conventional *collective* check.

Two GO rolls serve to pass parts that are not oversize and which *will* assemble. These rolls screen out parts which are oversize or which will not assemble because of an excessive error or combination of such errors in lead, angle and pitch diameter.

As the parts are passed from the GO or assembly rolls and are presented to the two NOT GO rolls, one of which is mounted so as to actuate a dial indicator, the dial shows whether the pitch diameter is too small and *by how much*. Should the pitch diameter show as being within tolerance limits and near basic, then it can be assumed that lead and angle are not only within tolerance limits but are also of the highest dimensional quality.

A free-rotating backstop enables the part to be properly located for accurate checking and also permits checking for out-of-round. The backstop, together with the indicator, eliminates the need for a trained sense of "feel" in making the NOT GO check—a most important advantage of the THREDCHEK.

Both sets of rolls are PRECISIONPLATE—Sheffield precision chrome plate—for longer life. Full manufacturing tolerances may be utilized because wear allowance is compensated by adjusting the rolls on their eccentric axis. The open end style permits checking close to a shoulder.

THREDCHEKS are available in frame sizes corresponding closely to Sheffield Thread Roll-Snap Gages, with standard or special pitch rolls. *Write for engineering data "Instruments #8".*

THE SHEFFIELD CORPORATION

Dayton 1, Ohio, U. S. A.

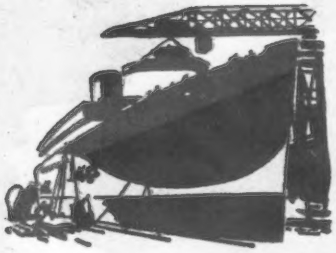
SHEFFIELD MASTER CRAFTSMEN

MACHINE TOOLS · GAGES · MEASURING INSTRUMENTS · CONTRACT SERVICES

West Coast . . .

OSGOOD MURDOCK

• Who knows how Pacific area manpower adds up when Calship lays off 5200 at Los Angeles, Admiral Cochrane wants 132,000 more Navy Yard repair workers and Kaiser is authorized to divert 3000 shipbuilders at Portland to build aluminum pontoons.



LOS ANGELES — Calship's payroll at Wilmington will level off at 27,000 by the end of January, officials of the yard have announced. That figure is 5200 below recent payrolls. In other words, one honest, forthright, well-managed West Coast maritime shipyard is courageously laying off 5200 men and telling the world so.

Included among those who will be separated are chronic absentees and marginal producers. Some honest, capable workers will also be free for other war work. There is no use pussy-footing, says the management. For the past few months they have been under pressure to produce troop transports and now that they return to their regular eight-hour, three-shift day on AP2 cargo ships and plan production to coincide with delivery schedules on turbines, gears and component parts, they can get along with 15 or 20 per cent less workers.

This candid statement bears out a suspicion which has long been held by level-headed operators and observers that there are enough willing hands and competent workers on the West Coast to carry on and maintain even expanded production and traffic schedules and requirements, if all were sufficiently utilized, and if there might be a little less poker playing by some private managements and a lot less fumbling by most public agencies responsible for the freezing, unfreezing, allocation, referral and manipulation of manpower. Perhaps this straw will help to blow up at least a gentle wind.

Sam Kagel, war manpower director for northern California, who has a labor background and is more outspoken, realistic and practical than most, told a meeting of USES managers at the state capitol recently that the labor force in the California area has decreased about 30,000 during the past year with ship construction employment down about 51,000 while ship repair employment has increased about 17,000.

"It's going to be tough" says rugged Sam Kagel. "People who were tired six months ago are six months more tired now and will be six months more tired in July than they are today. Conditions haven't been pleasant for the thousands who came here to help the war effort. Transportation is lousy and housing often is bad. More workers are needed in service industries, including ship repair and transportation, and more men capable of performing heavy work. Literally we are at the beginning of the Pacific War and recruitment of workers from other regions of the nation has practically stopped because of lack of housing. People who are now here will have to continue to do the job."

MONDAY morning following President Roosevelt's radio call for a labor draft, a swarming deluge of applicants for work in war industries besieged USES offices in Los Angeles. Men never employed during the war along with many in unessential jobs joined the pell mell rush to get into the "must" program. All draft categories from 1-A to 4-F were represented in the throngs that overflowed the 19 hiring offices in Los Angeles and Orange County. So volatile are reactions these jumpy days in this harried area that 24 hours later the rush was over and the stream of job applicants had dwindled to a trickle. In place of thousands the previous day less than 75 were at the registration windows at 10 o'clock Tuesday morning.

Col. Francis V. Keesling, Jr., No. 1 assistant to General Hershey in Selective Service at Washington was scheduled to address the San Francisco Commonwealth Club on Friday, Jan. 12 on "Manpower Problems of the Present and Future." Not only was he unable to be present but on telegraphic instructions from Washington, a representative was forbidden to read his address before the 400 assembled business men on the pretext that such an address in San Francisco might be interpreted as an attempt to influence members of Congress on a controversial question under legislative consideration. So far from the seats of the mighty and so confused and yet concerned by conflicting announcements and uncertainties of policy, the far West now finds manpower its No. 1 problem and No. 1 mystery. Quien sabe?

TOWARD general preparation for battle damage repair and marine overhaul on a grand scale, the Navy has announced that its new drydock at Terminal Island will be doubled in personnel this coming year. Development of the yard has so far cost approximately $150,000,000, it was disclosed by Rear Admiral Edward L. Cochrane. For this and similar programs in every major Navy yard on the West Coast Admiral Cochrane was quoted as estimating that 132,000 additional workers would be needed in these yards this year. Such a figure seems over-ambitious by at least one decimal point!

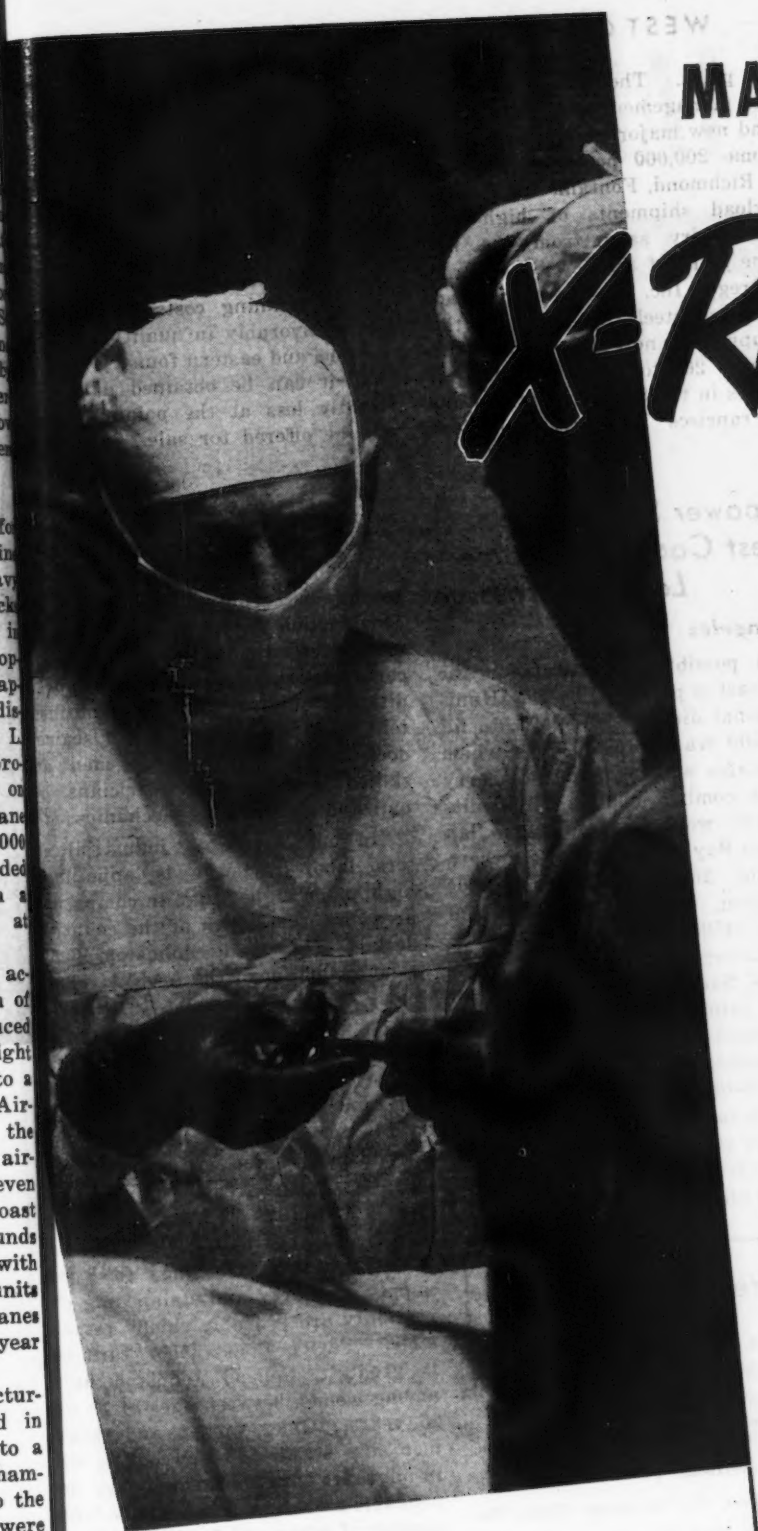
Pacific Coast aircraft plants, accounting for more than one-fourth of the nation's plane output, produced 12 per cent more warplanes by weight in 1944 than in 1943, according to a year-end announcement of the Aircraft War Production Council, the joint organization of the principal airframe manufacturers. These seven major companies in their West Coast plants produced 341,330,900 pounds of aircraft in 1944, compared with 304,975,600 pounds in 1943. In units 1944 production was 25,189 planes compared with 26,125 planes a year ago.

During 1944, 232 new manufacturing enterprises were established in Los Angeles County, according to a summary by the gratified local Chamber of Commerce. In addition to the new establishments, expansions were reported by 322 existing factories. Total capital investment of $41,864,110 was represented in the new industries and expansions.

* * *

SEATTLE—Pacific Car & Foundry Co., of which Paul Pigott is president, has announced purchase of a controlling interest in the Kenworth Motor Truck Corp. also at Seattle. For years the late P. G. Johnson, Boeing president, was also president of Kenworth.

Pacific Car & Foundry operates a



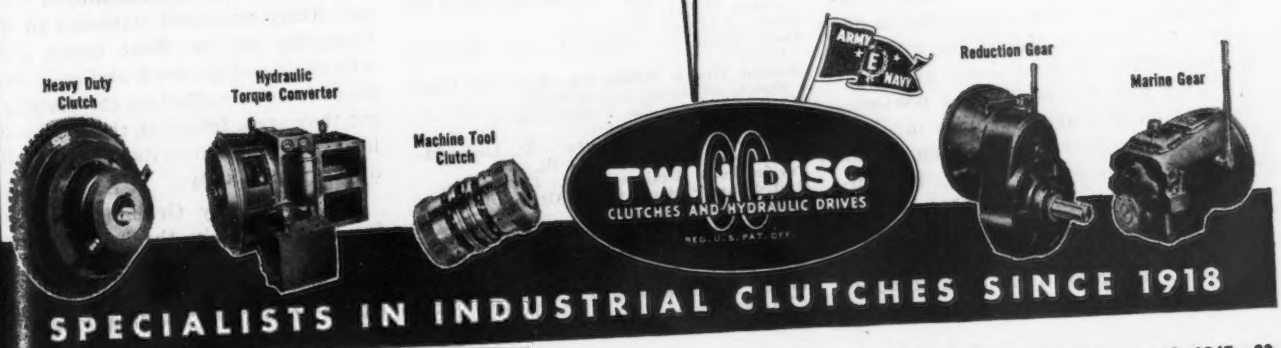
MAN WITH THE X-Ray Eyes

TO SAVE LIVES. That is the lifework of this man in the mask... this man with the X-ray eyes who knows each delicate membrane and muscle of the human organism better than he knows the palm of his own steady hand.

To save time and money and back-breaking toil through the development of more efficient methods of power transmission and control. *That* is the lifework of the men who design and build Twin Disc Friction Clutches and Hydraulic Drives.

Like the surgeon, whose experience has been enriched each time he lays aside his scalpel, each of the ever broadening applications of Twin Disc power links has given Twin Disc engineers a better understanding of the needs of industrial clutch users...an improved ability to meet those needs.

If the product you are building or planning to build requires a connecting link between driving and driven member—either friction or hydraulic—you will do well to remember that Twin Disc has devoted more than 26 years to the study *and solution* of the manufacturer's power transmission problems. Twin Disc engineers will be glad to give you their recommendations...and you can be sure that those recommendations will be given without obligation...honestly and impartially as to "friction or hydraulic". TWIN DISC CLUTCH COMPANY, Racine, Wisconsin (Hydraulic Division, Rockford, Illinois).



SPECIALISTS IN INDUSTRIAL CLUTCHES SINCE 1918

large steel foundry, machine shop and steel fabrication plant at Renton and a fabrication plant in Seattle and an Army Ordnance assembly plant at Billings, Mont. Kenworth operates nationally producing heavy duty trucks of all types with a principal plant in Seattle and a truck assembly plant in Yakima, Wash. Both companies have been important suppliers of parts and sub-assemblies for Boeing as well as for Army Ordnance. Under the new relationship the combined organizations will devote their efforts to developing highway and city passenger carrying motor coaches in the Kenworth division and structural steel fabrication, logging equipment, machinery and possibly railway equipment under the Carco aegis.

Another convert from wood to steel marine construction is a shipyard at Stanwood, a little town about 28 miles north of Everett, in starting to produce steel barges for the Army. Fabricated steel sections will be received from mills elsewhere, to be welded and assembled into barges 104 ft. long with 30 ft. beam and 8 ft. draft.

An $8,000,000 zinc refinery is in prospect for the Pacific Northwest on completion of a current survey and study by American Smelting & Refining Co. Engineers from the company's New York headquarters have been working out of the company's Tacoma copper smelter, checking other possible sites at Spokane and along the lower Columbia River from Cascade Locks to Astoria. There is possibility that the zinc plant might be at Tacoma. The company contemplates spending between $6,000,000 and $10,000,000 and would employ 1000 persons to produce refined zinc through a special treatment of zinc concentrates.

Hearts in the Pacific Northwest whose beats respond to light metal impulses are all aflutter over a $12,000,000 contract which the U. S. engineers have placed with Oregon Shipbuilding Corp. at Portland for 4000 aluminum half pontoons for the Army. The Maritime Commission has authorized this yard to divert 3000 workers for its new enterprise, to deliver 200 units in March, 300 in April, 600 in May, 900 in June and 1000 in July and August. These pontoons are to build floating bridges in overseas war theaters for movement of troops, trucks and supplies. If manpower is as short as some officials claim it to be at West Coast ports, such a new contract seems inconsistent, for these units could readily be fabricated and assembled at an interior point. There is a magic in Kaiser management and in its ability to land new major contracts and hold its some 200,000 personnel at Portland, Richmond, Fontana and Denver.

Carload shipments of high heat steel foundry sand from the new Eugene plant of the new Silica Products Oregon Inc. are now being made to Portland steel foundries and this new supplier is now in position to furnish from 200 to 300 tons a day for foundries in the Seattle, Portland and San Francisco Bay areas. Balfour Guthrie & Co. are sales agents. Characteristics of this sand are its uni form sub-angular grain. It is washed dried and screened at a new DP plant and tests have shown that clean smooth castings can be made up t 3300 deg. F. It is claimed for th sand that it represents a further sav ing in cleaning costs, that it com pares favorably in quality with mid western and eastern foundry sand an that it can be obtained at a price slightly less at the points where i will be offered for sale.

o o o

Manpower Shortage On West Coast May Force Labor Draft Issue

Los Angeles

• • • **A possible labor draft** on the West Coast is predicted by Fay Hunter, regional director of WMC, to fill the 67,500 war industry jobs which he estimates will be needed to carry on these coming months. He splits his "must" workers as follows: San Francisco Bay Area, 18,210; Southern California, 25,000; Oregon, 13,000; Washington, 19,000; Nevada and Arizona, 4500; Alaska, 1000 per month for replacements.

In the San Francisco Bay Area, with its primary harbor and supply headquarters for Pacific operations, yards, docks, basins and ways are steadily being converted for repair and maintenance including battle damage. Navy seems anxious to take over in large part the Kaiser facilities at Richmond and Western Pipe and Steel yards at South San Francisco a auxiliaries to Mare Island and Hunt ers Point. Moore on the Oakland estuary is swinging over from new construction to repair, involving some manpower adjustment with release o certain worker classifications and ad dition of others. Desperate and insis tent shortages continue for seamen dock laborers, warehouse men and skilled shipwrights, electricians, re pair and maintenance mechanics.

"In some West Coast industrial cen ters labor turnover is appallingly high, much higher than in comparable areas in other parts of the country," declares Col. G. R. Johnston, public relations officer of the AAF Air Tech nical Service Command. Out of 52 major aircraft assembly plants in the United States, the West Coast is em barrassed that two of its principal airframe manufacturers occupy the two bottom places on the national list for labor absenteeism in the last six months. In one area the rate of turn over has been as high as 85 per cent for the six months period. Restless ness, congestion, housing, food and supply shortages and stampeding un certainty are probably chiefly respon sible. Pacific Coast labor turnover is greatest, Colonel Johnston finds, among women between ages of 18 and 25 years. Older women and skilled men are steadier. Newcomers and in-migrants are naturally less de pendable and more restless. The large number of wives and families of Navy and Army personnel stationed on and operating out of West Coast ports who come and go, work and stop, have an unfavorable effect on the statistics, yet they are a factor on the total work load that contributes its share in spite of its irregularity.

Another Army Ordnance contract for approximately three and a half million dollars for the manufacture of 90 mm shells has been awarded to Kaiser Industries, principally for production at the Denver plant.

Cited for Awards

• • • **The following companies** have received Army-Navy "E" awards for outstanding war production:

Anderson Hickey Co., Geneva, Ill.
L. E. Carpenter & Co., Plant No. 2, Wharton, N. J.
Cincinnati Advertising Products Co., Cincinnati.
Clark Equipment Co., Buchanan Plant, Buchanan, Mich.
Coplay Cement Mfg. Co., Machine Shop Division, Coplay, Pa.
Dorsey Brothers, Elba, Ala.
Fuller Brush Co., Hartford Plant, Hartford, Conn.
General Tire & Rubber Co., Bluff and Union Streets Divisions, Akron, Ohio.
E. O. Habhegger Co., Philadelphia.
Mercury Mfg. Co., Chicago.
National Slug Rejectors, Inc., St. Louis, Mo.
F. H. Noble & Co., Chicago, Ill.
Pacific Sound Equipment Co., Los Angeles.
United-Carr Fastener Corp., Aircraft Parts Division, Cambridge, Mass.
Waltham Watch Co., Waltham, Mass.
Briggs Clarifier Co., Washington, D. C. (second star)
Chain Belt Co., Milwaukee. (third star)
Hooker Electrochemical Co., Tacoma Plant, Tacoma, Wash.
Wiedemann Machine Co., Philadelphia.

HYDRAULIC BALANCE

CANCELS OUT BEARING LOADS

And Means MUCH LONGER PUMP LIFE

Diagram showing patented "Hydraulic Balance" construction.

As illustrated by the diagram above, equal and opposing pressure areas are provided on the outlet side and on the inlet side of Vickers Balanced Vane Type Pumps. The equal and opposing radial hydraulic thrust loads cancel each other . . . consequently there are *no* bearing loads resulting from pressure. The major cause for wear is thus completely eliminated and the result is much longer pump life. This "Hydraulic Balance" construction is exclusive with Vickers Vane Type Pumps; it also permits an unusual design compactness and is an important reason for the exceptionally high efficiency of these pumps.

Vickers Balanced Vane Type Pumps are available in single-stage for 1000 psi (see Bulletin 40-25a); two-stage for 2000 psi (see Bulletin 40-16) and also two-pressure, large-small volume (see Bulletin 38-14). Vickers Application Engineers will gladly discuss with you the many different types of hydraulic power and control circuits on which these pumps have improved machine performance. Write the office nearest you.

VICKERS *Incorporated* • **1420 OAKMAN BLVD.** • **DETROIT 32, MICHIGAN**

Application Engineering Offices: CHICAGO • CLEVELAND • DETROIT • LOS ANGELES • NEWARK • PHILADELPHIA • ROCHESTER • ROCKFORD • TULSA • WORCESTER

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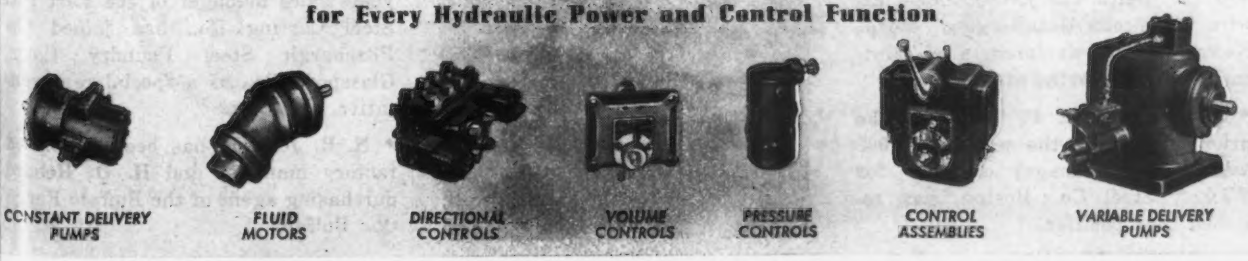


CONSTANT DELIVERY PUMPS | FLUID MOTORS | DIRECTIONAL CONTROLS | VOLUME CONTROLS | PRESSURE CONTROLS | CONTROL ASSEMBLIES | VARIABLE DELIVERY PUMPS

PERSONALS

JOHN M. OLIN, president, Olin Industries, Inc.

• **John M. Olin** has been elected president of the Western Cartridge Co., East Alton, Ill., succeeding his father, **Franklin W. Olin**, who has retired. **Spencer T. Olin**, a younger son and a Western vice-president, succeeds his brother as first vice-president.

• **F. H. Hirschland** has been elected chairman of the board and **Frank J. O'Brien** president of the Metal & Thermit Corp., New York. **E. Becher**, first vice-president, has retired. Mr. Hirschland has been president of the corporation since 1922 and Mr. O'Brien was for many years and until recently vice-president of Continental Can Company, Inc., New York.

• **Emory L. Johnson** has resigned as foundry manager of the Farrel-Birmingham Co., Inc., Ansonia, Conn., to become a sales and foundry consultant of the Malleable Iron Fittings Co., Branford, Conn.

• **F. E. Neveu** has been appointed superintendent of the St. Paul plant, U. S. Steel Supply Co., Chicago, succeeding **Austin E. Slattery**, retired. Mr. Neveu has been associated with this U. S. Steel Corp. subsidiary since 1929, and has served as general foreman of the St. Paul plant for the past two years.

• **J. E. Smith** has joined the Wickwire Spencer Metallurgical Corp., Newark, N. J., as foreman of fabricated parts department.

• **Lt. Col. Alden F. Erikson**, who prior to entering the service in 1942 was district manager of sales for Wickoff Steel Co., Boston, has resumed that position.

• **Harold L. Springer, Jr.**, has been elected president of the Lobdell Co., Wilmington, to succeed the late Howard Lobdell Seaman. Mr. Springer joined the company in 1930. He was foundry foreman for several years, becoming assistant secretary in 1939 and in 1941 secretary and treasurer, and served in that capacity until his recent election as president.

• **LeRoy A. Petersen**, of the Otis Elevator Co., New York, has been elected president to succeed the late **Jesse H. Van Alstyne. Edward A. Fitch**, a vice-president of the company, has been elected to the board of directors.

• **Arden LeFevre** has been appointed vice-president and director of engineering, Division One, MacFarland, Aveyard & Co., Chicago; **George W. Oehlsen, Jr.**, has been named assistant director of engineering and **Fred R. Cross** advertising manager.

• **Frank Lynch**, formerly district manager at Detroit, of the Automotive Division, Timken Roller Bearing Co., has been appointed Detroit district engineer for Reynolds Metals Co., Richmond.

• **Vernon Isgren** has been appointed Mississippi plant manager, LeTourneau Co. of Georgia. Mr. Isgren joined the company in California in 1929, was made superintendent of the Peoria, Ill., Plant No. 3, in 1941 and in 1944 was transferred to the Mississippi plant.

VERNON ISGREN, Mississippi plant manager, LeTourneau Co. of Georgia.

IRVING B. BABCOCK, president, Aviation Corp.

• **Irving B. Babcock** has been appointed president of Aviation Corp., New York. Previous to his present position, Mr. Babcock had been general manager of the General Motors Truck and Coach Division and a vice-president of General Motors Corp., Detroit. **Victor Emanuel** has become chairman of the Board of Aviation Corp.

• **Andrew E. Kuby**, one of the founders of Standard Steel & Wire Corp., Chicago, has been elected president and treasurer; **Eugene L. Rippel**, for the past eight years Chicago district manager for Greer Steel Co., has been elected vice-president in charge of sales; **William A. Wade**, associated with Steel Sales Corp., Chicago, for the past 18 years, has been made vice-president; and **Elmer C. Lundahl**, who has been with Standard since its inception in 1920 has become secretary. These officers also have been elected directors of the firm.

• **Royal L. Meyer** has been appointed chief engineer and assistant manager of the Steam Division, the Swartwout Co., Cleveland. **M. M. Ward**, who has acted as an engineer and assistant sales manager, has been named sales manager of the division.

• **Thomas F. Dorsey**, for the past ten years sales manager of the Fort Pitt Steel Casting Co., has joined the Pittsburgh Steel Foundry Corp., Glassport, Pa., as a special representative.

• **N. R. Johnson** has been appointed factory manager and **H. D. Hebard** purchasing agent of the Buffalo Forge Co., Buffalo.

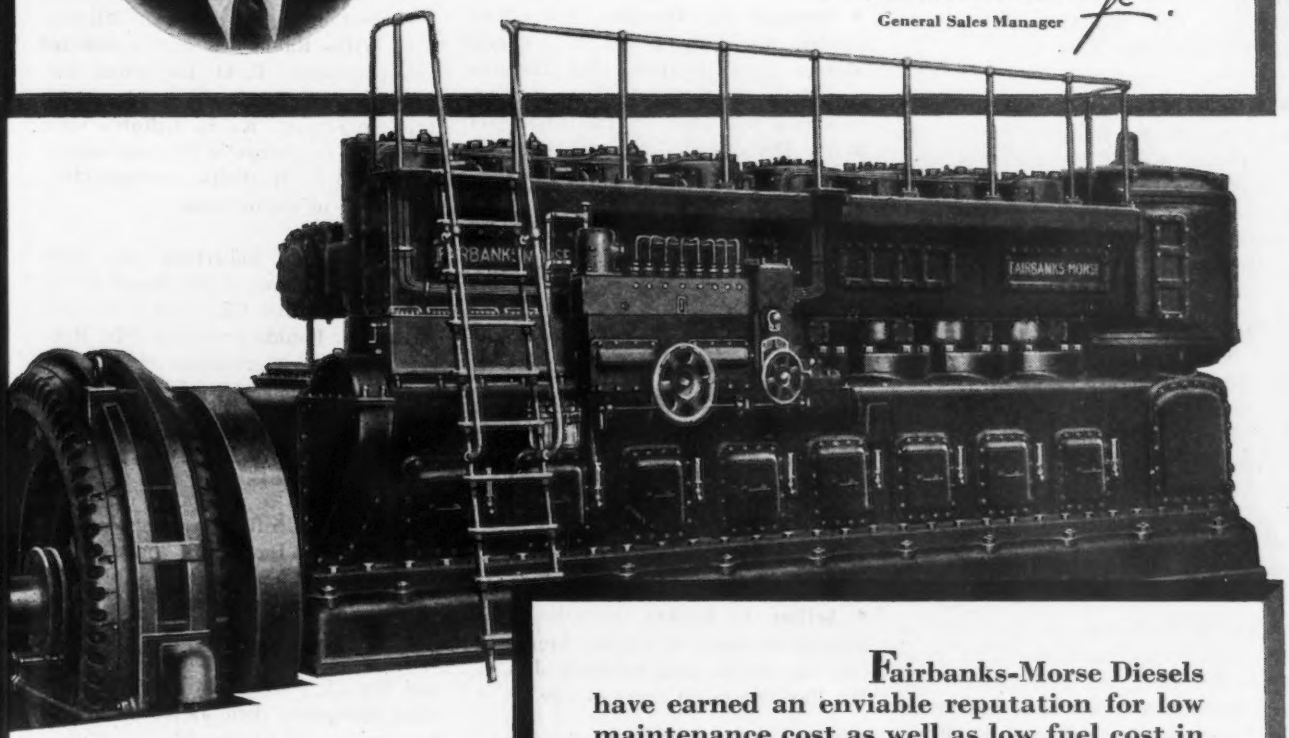
"A name worth remembering"

FAIRBANKS-MORSE

Fairbanks-Morse postwar products will serve you with the *dependability* the world has come to associate with our name. Designing and manufacturing skills will not have to be re-learned in our plants as we turn to civilian production, because as a part of our war job, we've continued to build and improve our peacetime Diesel engines, generators, motors, pumps, and scales.

R. A. Morse Jr.

General Sales Manager



Fairbanks-Morse Diesels have earned an enviable reputation for low maintenance cost as well as low fuel cost in sustained, heavy-duty service. Fairbanks, Morse & Co., Chicago 5, Illinois.

DIESELS

Diesel Locomotives • Diesel Engines • Generators
Motors • Pumps • Scales • Magnetos • Stokers
Railroad Motor Cars and Standpipes • Farm Equipment

BUY AND KEEP MORE WAR BONDS

• **Nils H. Lou,** formerly factory manager, has been appointed assistant to the vice-president, Manufacturing Division, the Glenn L. Martin Co., Baltimore. Mr. Lou has been succeeded by **Robert Young,** previously assistant factory manager. **Norman Stewart** has been made assistant factory manager, and **Robert Bounds** factory superintendent of the Army Division.

• **Dr. Robert V. Yohe** has been elected vice-president of American Anode Inc., Akron, a B. F. Goodrich Co. affiliate.

• **H. V. Erben,** has been named assistant general manager of the Apparatus Department, General Electric Co., Schenectady; **C. H. Lang** has been appointed manager of sales; **H. A. Winne,** manager of engineering; **Neil Currie, Jr.,** manager of manufacturing; **Guy S. Hyatt** has been placed in charge of accounting and **W. W. Jenkins** has been made counsel for the same department.

• **Earl L. Wiseman,** formerly manager of the Ventilator Division, the Swartwout Co., Cleveland, has been named vice-president. Mr. Wiseman was made manager of the division in 1943 and has been sales manager for eight years.

• **D. C. Greene** has been named district manager in the New York area for Haskelite Mfg. Co., Grand Rapids.

• **J. F. Considine** has been appointed assistant district manager of the Chicago plant, American Car & Foundry Co., New York, and **W. C. Roederer** has been appointed assistant district manager of the St. Charles plant.

• **Paul R. Fishburn,** who has been in the engineering department of Erie Meter Systems, Inc., Erie Pa., for the past eight years, has been appointed chief engineer, succeeding **L. R. Olsen,** resigned.

• **C. E. Hill** has been appointed manager of the Chicago branch, Reeves-Pulley Co., Columbus, Ind. Mr. Hill has been associated with the Chicago office for many years.

• **J. Mader,** implement engineer for the S. L. Allen Co., Philadelphia, for the past 23 years, has joined Maremont Automotive Products, Inc., Chicago, as chief engineer of the Farm Tool Division; **William Stout** has been appointed sales and distribution manager of the same division.

MORGAN D. DOUGLAS, vice-president, General Motors Corp.

• **Morgan D. Douglas** has been elected a vice-president of General Motors Corp., Detroit. Mr. Douglas was formerly general parts and accessories manager of the Chevrolet Motor Division and general manager of the General Motors Parts Division.

• **Alexander Gobus** and **Charles Davidoff** have been elected vice-presidents of Sam Tour & Co., Inc., New York.

• **Norman C. Hurd** has been named acting manager of the Cincinnati Manufacturing and Repair Department, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

• **P. L. Barter** has been elected vice-president of McCord Corp., Detroit; **W. G. Hancock,** vice-president in charge of operations and **James H. Cooper,** works manager in charge of all plants.

• **Frank P. Rhame,** a director and vice-president and, prior to his recent appointment, assistant general manager of the Lunkenheimer Co., Cincinnati, has been made general manager, succeeding **Charles A. Brown,** retired. **Homer E. Lunken,** a director, succeeds Mr. Rhame as assistant general manager. **Carra L. Lane,** has been named works manager, succeeding **George A. Seyler,** who has retired as vice-president in charge of manufacturing. **Fred H. Hehemann** has become chief engineer, succeeding **Jerome J. Aull,** who has retired after nearly 50 years of service with the company.

• **C. W. Pendock** has been reelected president of the Le Roi Co., Milwaukee; **Willis Rabbe** has been appointed vice-president; **T. O. Liebscher,** secretary-treasurer; **T. S. Tuttle,** assistant secretary; **K. E. Gifford,** vice-president in charge of Centaur operations, and **P. W. Eells,** vice-president in charge of engineering.

• **W. Spencer Robertson** has been elected chairman of the board of directors, Permutit Co., New York, and **Henry W. Foulds** president. Mr. Robertson has been president of the company for the past 15 years while Mr. Foulds has been executive vice-president since 1935.

OBITUARY . . .

• **Arthur L. Parker,** president and general manager of Parker Appliance Co., Cleveland, died suddenly Jan. 2. Mr. Parker was 60 years of age.

• **Walter J. Nisbet,** 67, former executive sales manager of the Washburn-Crosby Co., Buffalo, died recently. Mr. Nisbet had been associated with the milling company for 35 years and was sales manager of the Indianapolis branch for many years.

• **Edward W. Neumeister,** 69, vice-president and director of the Cherry-Burrell Corp., Milwaukee, died January 4, after a year's illness. Mr. Neumeister was one of the organizers of the firm.

• **Orville K. Dyer,** 65, manager of the small-blowers department, Buffalo Forge Co., Buffalo, died January 4.

• **Walter H. Girdler, Sr.,** president of Tube Turns, Inc., and the Girdler Corp., Louisville, Ky., died on Jan. 7.

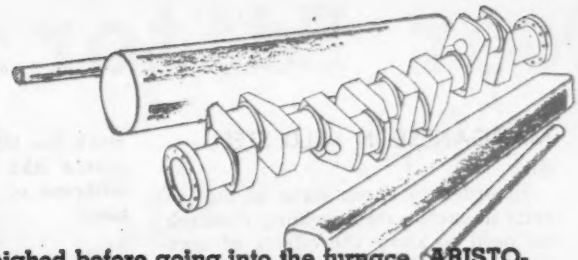
• **Lewis C. Kenyon,** for 27 years with Heald Machine Co., Worcester, Mass., and for 25 years New York branch office manager, died January 9. Mr. Kenyon was 57 years old.

• **William P. Casey,** sales engineer in Buffalo for the Industrial Furnace Division of R-S Products Corp., Philadelphia, died January 3.

• **Evan W. Ost,** 40, representative in Milwaukee for the MacWhyte Co., Kenosha, Wis., for the past 20 years, died January 3.

• **G. W. Lowe,** 70, retired secretary of the Nordberg Mfg. Co., Milwaukee, died recently. Mr. Lowe was associated with the firm for more than 40 years.

here is Quality...



It's always a thrill to see a heat of steel tapped. But especially so when its ARISTOLOY electric furnace alloy steel. Every tap means forty tons of steel from carefully prepared ingredients — scrap, lime, fluorspar, ferro-alloys and other materials — carefully inspected, analyzed and weighed before going into the furnace. ARISTOLOY steels get off to a perfect start in this modern melt shop. Every subsequent operation in the production of ARISTOLOY electric furnace steel is carefully guarded. That's why Aristoloy should be your preference in electric furnace steels.

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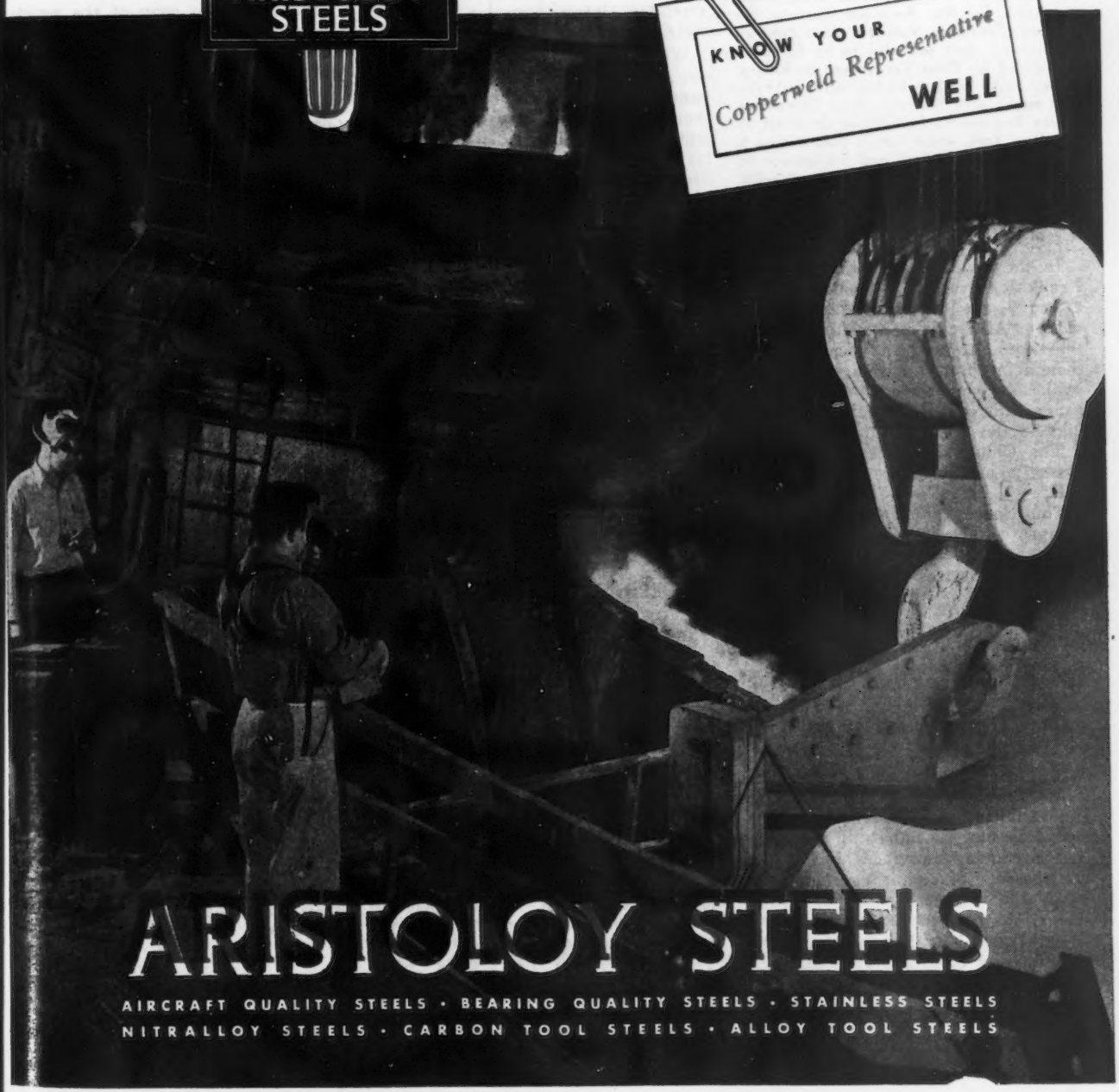
ARISTOLOY STEELS

KNOW YOUR *Copperweld Representative* WELL



ARISTOLOY STEELS

AIRCRAFT QUALITY STEELS • BEARING QUALITY STEELS • STAINLESS STEELS
NITRALLOY STEELS • CARBON TOOL STEELS • ALLOY TOOL STEELS

Dear Editor:

MANGANESE IN MILD STEEL

Sir:

In order to check some of our results in carbon steel welding research, we need to know the effects of manganese increases on properties. We desire to obtain figures or graphs showing the effects of manganese contents up to 1.5 per cent, for carbon contents of 0.12 to 0.30 per cent, on tensile strength, yield point, and per cent of elongation and reduction in area. Can you tell us where data can be obtained?

J. B. ARTHUR,
Engineer in Charge,
General Testing Laboratory
California Shipbuilding Corp.,
Wilmington, Cal.

● Refer to the article "Manganese as an Alloying Element in Pearlitic Steel," by A. Aoram Fulton in the ***Metals Handbook*** published by the American Society for Metals, Cleveland. Valuable chart data on tensile and yield are also to be found in ***Steel and Its Heat Treatment*** by Bullens, published by the Battelle Memorial Institute. You might write the Iron Alloys Committee of the Engineering Foundation, 29 West 39 St., New York, which has in preparation a book on alloys of iron and manganese to supplement its books on alloys of iron.—Ed.

MANVILLE ROLL THREADERS

Sir:

In the article on roll threading by Frank J. Oliver, in the issues of Nov. 2 and 9, the following statement is made: "Although many Manville roll threaders are now in use, many of them doing high precision work, within the last year the company has disbanded and sold its patents and drawings to the National Machinery Co., Tiffin, Ohio. For the present the Manville machines are off the market."

This last statement is incorrect because we are offering Manville machines and are building them for anyone who so desires.

FLOYD M. RUHR,
Sales Mgr.
National Machinery Co.
Tiffin, Ohio

● Sorry to have been in error; we hope it will not react to your disadvantage.—Ed.

CHINA'S STEEL AND COAL

Sir:

In Tom Campbell's interesting article, "Emotions Blur China's Future Industrialization Problem," in the Dec. 14 issue, the names of the large coal producing provinces have been transposed. Shansi is considered to have the largest reserves, while Shensi has the next largest.

With regard to the idea of importing iron ore from India to China, I cannot see the logic of it. The Chinese government has a project for establishing a big iron and steel plant at Chuchow, south of Changsha in Hunan Province. The foundation work for the blast furnace and steel plants had been started before the outbreak of the Sino-Japanese hostilities.

C. Y. WANG,
Director of Research
Wah Chang Trading Corp.,
Woolworth Bldg., New York 7

MILLIMETER MIXUP

Sir:

Your English correspondent whose letter was published in Dear Editor for Nov. 23, strikes a chord to which I resonate strongly. I shall never forget the pleasure of laying out a small gasoline engine in the metric system for the French market, or the despair when told that four-place inch decimals (cast surfaces included) would make an ordnance assembly interchangeable with its metric counterpart.

While the one-cc.-of-water-weighs-one-gm. relationship is sufficient advantage to satisfy any rational being, there are further features: A metric micrometer can be read without mental arithmetic; the tenths and hundredths mm. are much more near the actualities of fits and tolerances than thousandths and ten-thousandths of an in.; and thread diameters and pitches in increments of even mm. are just right for screw fastenings.

N. MONSARRAT,
Chief Engineer
Pantex Pressing Machine, Inc.
Pawtucket, R. I.

● Reluctance to take advantage of the simplicities inherent in the metric system probably springs from the inertia that governs so many other human functions. Many people would resent any interference in the established system even though technical men in this country have always relied on the c.g.s. system. At least in the matter of money our system is not as complex as the British.—Ed.

SOLDERING ALUMINUM

Sir:

In THE IRON AGE for March 13, 1941, an article on the soldering of aluminum mentions a chemical mixture for reaction soldering. Please send me further information concerning this method of soldering.

LESLIE W. COMBS,
Research Engineer
Lockheed Aircraft Corp.
Burbank, Cal.

● This article was abstracted from the British journal SHEET METAL INDUSTRIES. We have not located anyone in this country familiar with the process. Aluminum may be soldered at the low temperatures employed in reaction soldering by use of Eutectic No. 199 made by the Eutectic Welding Alloys Co., 40 Worth St., New York 13, Both flux and rod melt at a temperature of around 400 deg. F. Eutectic 199 is available in powder form and can be mixed with fluxes and preplaced even into very narrow spots. —Ed.

ELECTROLYTIC ETCH

Sir:

Please send more information and costs on the Lectroetch method of etching tools with pad and stencil reported in THE IRON AGE, Nov. 30 issue.

P. L. NEALIS,
Purchasing Dept.
White-Rodgers Electric Co.,
1209 Cass Ave., St. Louis 6

Where might we obtain information on the Lectroetch process?

WM. LARALEE,
Factory Superintendent
Burpee Can Sealer Co.,
Barrington, Ill.

● Equipment for marking metal by electrolytic action is made by Acme Metal Marking Equipment Co., 2232 West Fort St., Detroit 16, Mich. This equipment is named Met-L-Etch.—Ed.

STEEL MELT TEMPERATURES

Sir:

Please send a copy of the article, "Liquid Steel Temperatures Measured by Thermocouple," from the July 27 issue.

F. F. HOGG
Carbon Sales Div.,
Canadian National Carbon Co., Ltd.,
805 Davenport Rd., Toronto 4

● Tear sheet mailed.—Ed.

TUBE BENDING

Sir:

Please send a photostat of the article on "Tube Bending with Beeswax Filler" from the issue of Oct. 26.

JAMES A. FINDLAY,
Special Sales Representative
Michigan Seamless Tube Co.,
South Lyon, Mich.

● Tear sheet mailed.—Ed.

POSTWAR PLANNING

Sir:

An interesting article on "Design for Postwar Planning; check list as research guide for new or redesigned products" appeared in your issue of June 22. We should appreciate a copy for our file.

J. W. MALMQUIST,
Regional Technical Consultant
Smaller War Plants Corp.,
720 Hodgson Bldg., Minneapolis 1

● A copy of the article requested is sent with our compliments.—Ed.

PROPERTIES OF NE STEELS

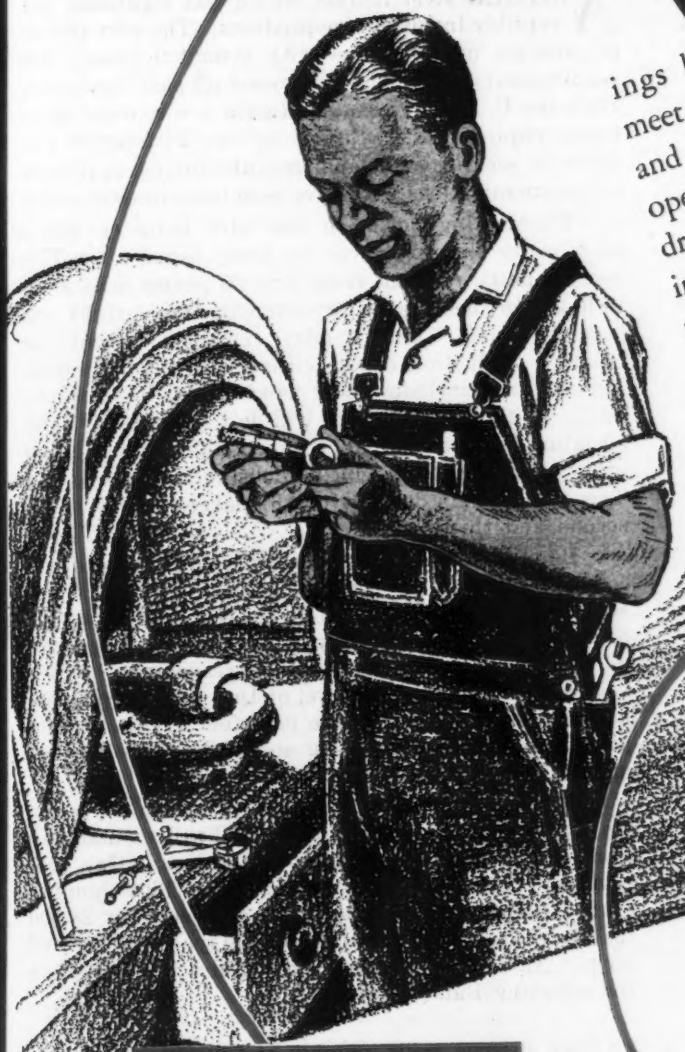
Sir:

We should like to obtain a copy of "Physical Properties of Some NE Steels" from the Dec. 21 issue of THE IRON AGE.

A. S. JAMESON
Works Metallurgist
International Harvester Co.,
Chicago

● The two-part article is being reprinted and will be ready for mailing in a week or two. It will be mailed at cost.—Ed.

Honest WORKMANSHIP in T and W Stampings



WHERE identical steel stampings by hundreds or thousands must meet accurate specifications, knowledge and care must be employed on every operation. Years of experience in deep drawing, and technically competent men in every department from engineering to final inspection at Transue assure you of this craftsman-like quality. Transue's reputation for uniformity, accuracy and finish was earned by such trustworthy workmanship.

TRANSUE & WILLIAMS
ALLIANCE, OHIO

Sales Offices:
NEW YORK, CHICAGO
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INDIANAPOLIS, DETROIT

DESIGNERS AND MAKERS OF DEEP DRAWN STAMPINGS

This Industrial Week . .

- ***Avalanche of Steel Orders Materializes***
- ***Steel Ingot Rate Fights the Elements***
- ***Army Inquiries for 7740 Tons of Nails***

IN the face of an avalanche of new steel orders, further extended deliveries and an increase in the number of pressure points by consumers, the steel industry this week was still struggling against the ravages of recent and current weather, repair difficulties and the prospect of a greater manpower shortage.

The steel ingot rate this week is estimated at 93.5 per cent of rated capacity unchanged from a week ago, all attempts to lift the activity back to the pre-holiday and pre-storm level having failed so far. A continuation of production difficulties as well as transportation tie-ups will have serious consequences on steel deliveries and will undoubtedly be reflected for some time to come in the magnitude of steel carryovers which have been mounting recently.

All the characteristics of an expanding steel market which were reflected in the early days of the war have attached themselves to the steel industry once again. Buyers who six months ago were inventory conscious and living off accumulated materials have depleted their surplus.

Finding the current steel market conditions extremely tight with delivery promises indefinite and far extended, energy is being expended by customers in an attempt to invoke official aid in crowding in near the front of the delivery line as well as placing future orders far beyond recent practices. Most consumers are meeting some current requirements by indiscriminate sapping of warehouse stocks. The tremendous impact of steel demand engendered by increased war needs and planning seems to have caused slightly less attention and consideration in the specifying of future orders on the part of buyers.

THE war-battered steel industry is not able today to display the same resiliency as four years ago in meeting the current buyers' rush. Already running close to capacity with the aid of patches and prayers, equipment is unable to bear further added loads and operating rates already give evidence of bending under the pressure. Labor reservoirs are drained and there is little hope of replenishment. Added shifts are out of the question for already tired workers.

Two of the most active consumers in the current rush for space on steel schedules are the same as in the early war period—the Maritime Commission and the aircraft industry. The former, which had indicated a retirement from the market, as reported, is now requiring almost a million tons of plates over a seven months period, thus snuffing out hope that continuous strip mills would be able to entirely shift their plate burden to less heavily booked sheared plate mills. In the past week inquiries have been heavy for aircraft alloy sheets for immediate delivery, although May is the best promise being quoted. The new Maritime plate requirements have pushed plate delivery promises from March into late April and May.

ANOTHER steel market which has tightened perceptibly involves wire products. The wire picture is growing more serious with communications wire requirements being boosted beyond all past experience. Both the U. S. services and Russia are coming in for heavy requirements. Efforts by one Pittsburgh producer in seeking additional manufacturing equipment for communications wire have been unsuccessful so far.

Plummeting down on the wire industry like a blockbuster this week was an Army inquiry for 7740 tons of nails, ranging from 3 to 60 penny in sizes as well as finishes involving common, box, bright and cement coated. This inquiry represents about one month's production of the entire nail manufacturing industry, and includes about 240,000 kegs of six penny nails. What such an order will do to an already tight situation is hard to predict, except that deliveries for other than the Army will be substantially postponed. The Army wants delivery on this large inquiry in the second and third quarters.

Buoyed on a wave of reinstated and extended war contracts, orders at some mills for the past week showed a volume increase of 50 per cent over the previous week and a substantially greater increase, approximating 200 per cent, over the corresponding week a year ago. Even the high level of December buying has been greatly exceeded in the past few weeks. Armor piercing shot producers, long absent from the market, are again ordering in heavy volume.

Spring manufacturers are loaded to capacity, principally for Army trucks. Even small caliber ammunition boxes promises to return to the lists. One boat company reports a new contract for 1300 landing craft. Fabricators were awarded contracts for 28,500 task force buildings requiring 78,000 tons of sheet and strip. An award is soon expected for 1000 adapters for widening Bailey bridges.

SOME district mills, notably at Chicago, are disappointed at the meager results secured from tightening of manpower regulations. Although there are reports that non-essential workers of draft age are flocking to U. S. Employment Offices, few have found their way to the steel mills. In some quarters it is generally agreed that further calls by the armed services will have to be paid for in lower steel output.

Because of the interim price increases allowed on some steel products by the OPA, THE IRON AGE weighted finished steel composite price has advanced from 2.308373c. per lb. to 2.334075c. per lb. This composite is made up from the base prices of a selected number of steel products which comprise a majority of shipments and which are weighted in relation to the per cent each of these products is to total quarterly shipments.

• **U. S. STEEL SHIPMENTS**—Shipments of finished steel products by subsidiary companies of U. S. Steel Corp. for 1944 were the highest on record. Shipments for December, 1944, were 1,767,000 net tons, which compare with 1,743,753 net tons in November, and 1,719,624 net tons in December, 1943. For the year 1944 shipments were 21,150,788 net tons compared with 20,147,616 net tons in the comparable period of 1943, an increase of 1,003,172 net tons.

• **STEEL OUTPUT RECORDS**—In 1944, for the fifth consecutive year, production of steel exceeded all previous records, according to American Iron & Steel Institute. Not for 60 years prior to the outbreak of the war had the steel industry established new output records more than three years in a row. Total production of open hearth, bessemer and electric furnace steel last year was 89,552,961 tons, an increase of more than 700,000 tons over the 1943 total of 88,836,366 tons. In 1940, the first of the five successive record-breaking years, production totaled 66,981,662 tons. Production in December of last year totaled 7,338,299 tons. In November, 1943, 7,273,908 tons were produced, while output in December of 1943 totaled 7,255,144 tons. During December of last year steel operations averaged 92.3 per cent of capacity compared with 94.3 per cent in November and 94.2 per cent in December a year ago. The average operating rate for the whole of 1944 was 95.4 per cent of capacity, compared with an average of 98.1 per cent in 1943, when capacity was substantially below the point reached in 1944 upon completion of the wartime expansion program.

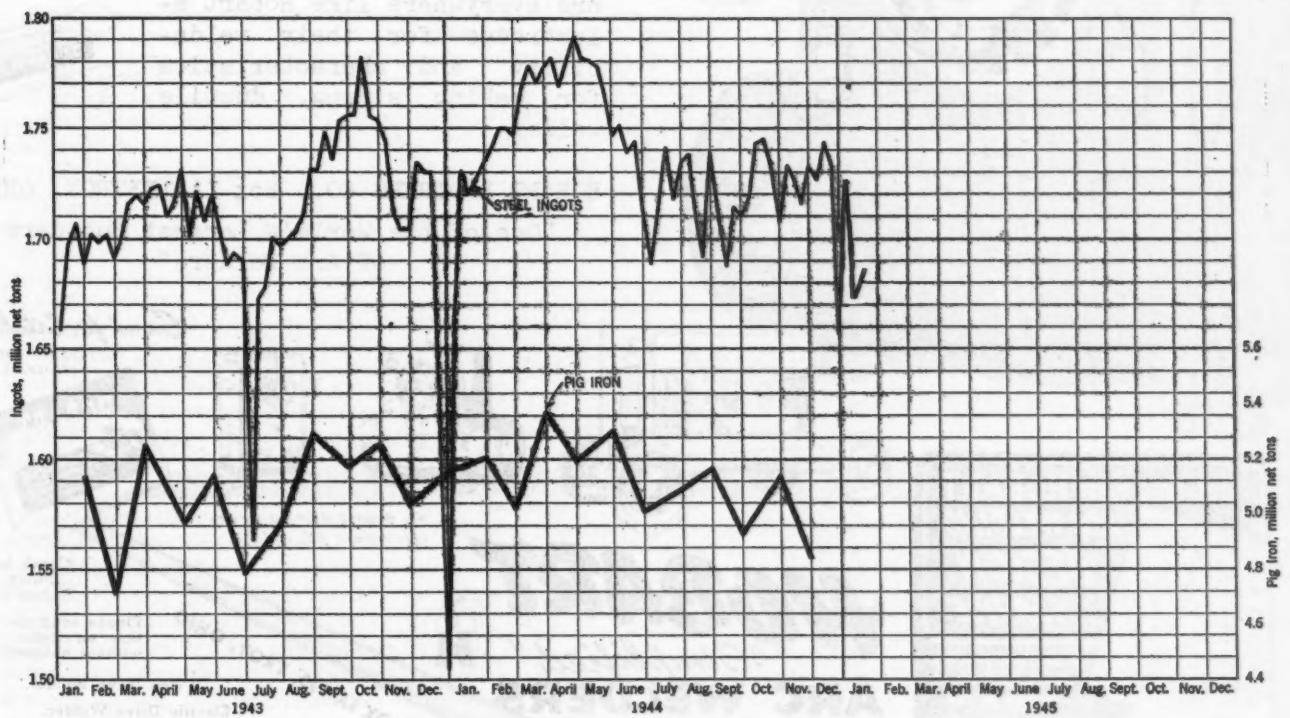
• **TERMINATION PAY PLAN**—Designed to keep employees on the job until cessation of production, a termination pay plan designed by Johnson & Johnson (Gas Mask Division) has been approved by the Regional War Labor Board. Termination wages equivalent to two months' salary will be paid to supervisory staff members, one month's salary to non-supervisory office staff members, plant group leaders, control clerks and guard sergeants, and two weeks' salary to plant general employees. When notice of cessation of production is given by the Chemical Warfare Service about a month prior to actual cessation, the company plans to notify employees of the fact but to continue full-speed production until contracts are completed. The plan affects 695 of the plant's 742 employees.

• **ALUMINUM SHEETS**—Aluminum sheet is tight not because of scarcity of facilities but because these facilities were curtailed last year when it appeared the war in Europe was in its closing stages, and manpower forces dispersed. Difficulty in recruiting labor will probably be cleaned up in around 60 days, and the squeeze on sheets will be ended.

• **TAX HYSTERIA**—Chicago business firms must keep track of 84 tax dates during the coming year, the 1945 tax calendar issued by the legislative department of the Chicago Association of Commerce shows. Tax dates in 1944 numbered 77, and in 1943, 60. This year the federal government will receive reports or payments or both on 54 dates. The state has 23 tax dates, the city 4 and the county 3. The calendar only lists those generally applicable to all business or to large groups of business and does not include special taxes or licenses applicable to particular lines.

• **POSSIBLE STEEL LOSS**—A 9,000,000 to 12,000,000 ingot ton production loss this year is being predicted by steel officials if Selective Service decides to cancel deferment of the industry's 60,000 26-29ers in its drive to secure 255,000 additional prime infantrymen in the next six months. This is worrying government men because workers in the 26-29 group furnish the muscle to the more strenuous operations in the industry and are therefore considered the backbone of production. It is estimated that only 36,000 of the 60,000 workers would pass the stiffer physical requirements and leave the industry with the remaining 40 per cent constituting 4F's.

• **SPOT AUTHORIZATION HIT**—In keeping with the War Department's push for increased munition production amounting to an $8,000,000,000 increase over October estimates of 1945 output value, WPB on Jan. 12 announced that the 250,000 tons of carbon steel slated for first quarter allocation under the spot authorization procedure has been cut to 150,000 tons and the proposed alloy allotment of 25,000 tons for this purpose has been cut to 10,000 tons for the quarter.



Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
January 9.....	91.0	99.0	90.0	97.0	90.0	78.5	91.0	99.0	93.5	97.0	98.5	94.5	106.0	93.5
January 16.....	91.0	98.5	90.0	97.0	90.0	78.5	92.0	95.0	92.0	97.0	98.5	94.5	106.0	93.5

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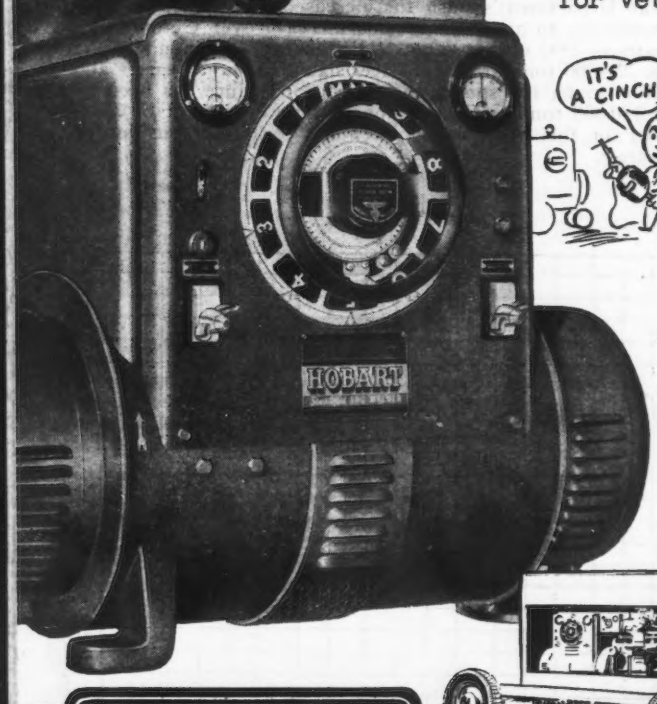

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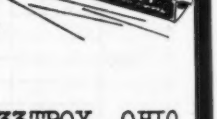

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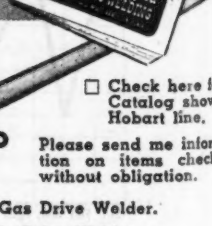

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Buy MORE War Bonds

More Steel Raises to Follow Interim Boost

Washington

By DON BROWNE

• • • Called a psychological gesture by OPA and designed to help small marginal companies out of trouble, the steel price increases permitted by OPA on Jan. 11 affected approximately 20,000,000 tons of finished capacity and represents, on an annual basis, a price increase to the steel industry of about $47,000,000. The yield of this amount is theoretical because it depends on whether the industry has open end contracts with both the government and other contractors in sufficient number to give full effect to the price increase. The increases were called minimums by OPA in its statement of considerations in the amendment of revised price schedule No. 6, iron and steel products.

OPA said that the increases are effective upon the "first pound" of steel shipped on Jan. 11, the date on which the increases were made public, and that they were to apply for an interim during which OPA will complete cost studies now underway.

Though OPA said that the increases are based upon a need of price adjustment that existed before labor wage adjustments became effective on Dec. 30, 1944, and that labor costs used in determining the price increases it announced were based on labor costs in effect prior to the Dec. 30 wage adjustment, the estimate it sent to Economic Stabilizer Vinson of the cost of the WLB decision ranged from $50,000,000 to about $110,000,000.

However, in the statement of considerations accompanying the order, OPA said that these increases were being given to the steel industry as a matter of law, and in view of the unusual circumstances surrounding negotiations for a price increase which have been going on for about a year.

Eastern basing point base prices for hot rolled carbon plates and sheets are $2.10 per 100 lb.; for galvanized sheets, $3.50 per 100 lb.; for rails, $40 per gross ton, f.o.b. mill; and for nails and staples, $2.55 per 100 lb. Increases authorized may be added by mills to delivered prices, which are made up of the base price plus extras and transportation.

Producers who have received price relief on these products will find that the price increase will either reduce the spread between their individual prices and the general price level, or make the spread disappear completely.

For instance, a company which previously because of hardship received a $2 a ton increase on plates will have no change in price in relation to the general price level. If the company had been given a $5 adjustment, its plate price will now only be $3 above the general price level.

With the exception of nails and staples, the increases will not be reflected in higher ceiling prices for sales out of warehouses.

Increases for other steel products will be provided, OPA said, as soon as the cost study, now under way, is completed, and interim increases will be given a final adjustment. Adjustments will be upward or downward, dependent upon the results of the study, and OPA added that present increases are not in excess of the minimum requirements of law.

The interim order is looked upon by OPA as a sort of breaking of the ice, and the feeling was expressed that it is better to have prices increased bit by bit, than to do the whole thing at once and provoke a lot of criticism. The increases are a show of good faith, OPA feels, and should be especially beneficial to non-integrated producers.

When OPA considered industry petitions for price increases last spring, it did not find anything to cause it to order across-the-board increases, but found that producers were sustaining "out-of-pocket" losses on various products when judged by the "product standard." It was on this basis that prices were increased, OPA said.

Wherever mills have fixed price contracts with consumers and with the government, there will be very little chance for companies to get the benefit of OPA's interim increase of prices. Contracts will be legally binding at the fixed prices, and the War Department says that it will not adjust such contracts unless extreme hardship is shown.

The Navy Department says most of its contracts are open-end and include an escalator clause. The War Department and the Maritime Commission now have escalator clauses written in their open-end contracts.

The clause adopted by the Army and Navy is as follows:

"The contractor represents and warrants that the prices shown herein are not in excess of the maximum prices

Steel Price Increases

• • • The price increases together with approximate realization per product and tons shipped per month follow:

1. Hot rolled carbon plates (Produced to sheared mill or universal mill width and length tolerances) $2 per ton			
Shipped (estimate) ... 700,000 tons per month	Annual	Realization..	$16,800,000
2. Hot rolled carbon sheets (including specialties) $2 per ton			
Shipped (estimate) ... 597,165 tons per month	Annual	Realization..	$14,330,520
3. Galvanized sheets, roofing and siding $3 per ton			
Shipped (estimate) ... 123,628 tons per month	Annual	Realization..	$4,450,608
4. Rails (all types) $3 per ton			
Shipped (estimate) ... 230,000 tons per month	Annual	Realization..	$8,280,000
5. Nails and staples (ungalvanized) $5 per ton			
Shipped (estimate) ... 59,597 tons per month	Annual	Realization..	$3,575,820
Estimated total annual realization			$47,946,948
Monthly shipment of products on which price was increased			1,710,330 tons
Annual shipment of products			20,523,960 tons

established by OPA, or other authorized government agencies and in effect upon the date hereof, for the supplies to be furnished hereunder. In the event such maximum price applicable to any item is increased, the price payable for any subsequent delivery of such items made in accordance with the provision of the contract, shall be increased by the same number of cents or fraction thereof, per unit, that such maximum price may be increased up to and including the date of delivery. If the OPA maximum price in effect on the date of shipment of any of these supplies to be delivered hereunder is less than the price stated herein, the price payable for such supplies shall be the OPA maximum ceiling price in effect on the date of shipment."

The escalation clause ties contract prices to OPA ceilings, and only applies to steel products listed on CMP schedule 1 of CMP reg. No. 1.

War Department officials were unable to estimate the dollar value of fixed price and open-end contracts, but suggested that there are several ways which a steel producer can take to get the benefit of OPA increases.

Some War Department contracts provide for a review and adjustment of prices every 90 days, and other contracts that provide for renegotiation upon any substantial change in cost factors. Naturally wherever steel companies have direct contracts with the government with such clauses in them they will be able to take advantage of OPA's new ceilings.

Similarly wherever steel companies are subcontractors, which is true in the majority of cases, the extent to which they have advantageous contracts will control the extent to which companies may apply new prices.

Termination Loan Lag Holds Up Settlement

New York

• • • Financial circles report that very few proposed war contract termination loans have been coming to the banks in recent weeks. Some observers see the lag as another reflection of a generally slow contract settling situation which Army and Navy representatives have called to industrialists' attention.

As expressed by Rear Admiral H. L. Merring, deputy chief of the Navy Industrial Readjustment Branch, the official view is that speedy settling of contracts, so as to enable quick clearing and refitting of plants for new work, is imperative for maximum war production. He foresaw that if terminations lag, and plants are not cleared promptly for new operations, the whole production machine might become bogged down, with plants clogged with surplus material or perhaps forced to close.

At a clinic on war and transition problems held by the National Association of Manufacturers, Brig. Gen. D. N. Hauseman, director of the Readjustment Division of the Army Service Forces, declared that a survey made some weeks ago in Boston revealed more than half of the subcontractors in that area as not even having heard of termination. They were totally unaware of the problems to be faced.

Termination loans have been recommended as especially adapted to lower-

For details on Termination Loans see THE IRON AGE, *Dec.* 21, 1944, *page* 112.

tier subcontractors' interim financing needs. Yet evidence that few new termination loan proposals have been made recently suggests that the situation about which representatives of the Army and Navy Service Forces have protested has not changed for the better.

While government complications are notorious for holding up industrial operations, in the case of contract terminations these officials placed the fault at the door of contractors themselves. In 1944, Gen. Hauseman contended, the War Department greatly reduced the time it took to settle claims after those had been submitted. But industry, he declared, increased the time it takes to arrange for settlement.

Among the practices which, he declared, have been holding up terminations, is that of prime contractors failing to prepare their subcontractors for termination. Also, they have not asked for sufficient delegation of authority for settling subcontractors' claims.

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IN FOR REPAIRS—*American tanks, damaged in battle and recovered from battlefields, are collected at an ordnance depot in France for repairs by technicians. Tanks too badly damaged to be returned to combat are salvaged for usable parts. Germans, too, are salvaging American tanks, using numbers of Shermans in the Belgian drive.*

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Steel Price Suit Denied

Washington

• • • Department of Justice officials on Jan. 15 denied to THE IRON AGE that the Anti-Trust Division is presently planning to proceed against a number of steel companies for price maintenance violations of the Sherman Law with respect to carbon steel products. It had been rumored that such a suit against 20 of the largest companies would soon be filed by the anti-trust division.

Cancelled Deferments Could Cause Average Loss of 15 Per Cent

Washington

• • • **Cancelling draft deferments of** one out of three men in the 26-29 group needed by industry will cause a 15 per cent loss in war production, a WPB study reveals. The study was based upon averaged reports of the estimates of all WPB industry divisions.

Proposals which would overcome the necessity for withdrawing 225,000 men from the 825,000 deferred in this age group are being considered by the War Department and Selective Service. If put into effect only about 60,000 men would have to be taken from industry and an equal number from agriculture.

The proposals are designed to furnish to the Army an additional 210,000 men, so that with the withdrawal of 100,000 men in 2-C (deferred on farms), only the fringes of the 26-29 group would have to be disturbed.

The suggestions which were worked up by an inter-departmental committee are:

1. The Army and Navy should reduce the discharges by 15 per cent or an amount which would save the necessity of withdrawing another 10,000 men each month from industry.

2. Reduce the percentage of men to be rejected by 10 per cent each month, therby saving another 10,000 men.

3. Accept for induction 10,000 4F's not in essential activities from the 2,000,000 estimated to be in this group under 26. (There are 600,000 4F's under 22 and 1,356,000 under 26.)

4. Double the induction of men 30-32 not in essential activities who will be called between March and June. About 5000 a month are being inducted from this group now.

Spot Authorization Steel Quota Is Cut As Push Continues

Washington

• • • **In keeping with the War Department's** push for increased munition production amounting to an $8,000,000,000 increase over October estimates of 1945 output value, WPB on Jan. 12 announced that the 250,000 tons of carbon steel slated for first quarter allocation under the spot authorization procedure has been cut to 150,000 tons and the proposed alloy allotment of 25,000 tons for this purpose has been cut to 10,000 tons for the quarter.

WPB Chairman J. A. Krug said that fears of layoffs from cutbacks could be dispelled as he announced the rise in the supply program from $56,500,000,000 to $64,500,000,000. Seen as an effort to cut down turnover through promise of continuing high rate of procurement, the WPB statement was that further expansion of spot authorization would cease, but that no authorization already approved would be canceled.

In this new "austerity" mood, WPB has clamped on the brakes on new civilian manufacture by: (1) Withdrawing the authority to buy stainless steel under alloy steel allotments; (2) halting further issuance of allotments for copper and copper base alloys, except for copper base alloy castings; (3) reducing the allocation of copper wire from 1,500,000 to 500,000 lb.

Although particulars have not been officially released by WPB, an amendment strangling priorities reg. No. 24, which permitted manufacturers to secure tools for reconversion on an unrated basis, will be issued soon.

With the knocking off of the spot authorization plan, the reconversion preparatory policy of former Chairman Donald M. Nelson, has been withdrawn 50 per cent since the news of the German breakthrough into Belgium. The other portions of the plan such as permission to make experimental models, and authority to use aluminum still remain on the books.

Formalizes Permission To Make Forged Axes

Washington

• • • **Manufacture of forged** axes, adzes and hammers of types required for specialized jobs, is now permitted, in accordance with stated specifications, WPB has announced. Most of the newly permitted types have been manufactured heretofore through appeals procedure. Schedule II of the hand tools simplification order, L-157, as amended, adds a number of items to the schedule's appendices. The amended schedule also permits the use of alloy steel (NE series 8600 or 9400) as well as carbon steel for mine and railroad adzes. No increase in total production of items controlled by Schedule II will result from the manufacture of additional types permitted, since they will be substituted for types already being manufactured, WPB officials pointed out.

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ROBOMB ENGINE CASES: ***Workmen in a Ford plant stack engine cases for robot bomb jet propulsion engines. Current official explanation is that these bombs, exact counterparts of the German V-1, are for experimental testing.***

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Trend in Steel Delivery Delays Turns Upward As Promises Become More Extended

Chicago

By CHARLES T. POST

o o o

• • • **Deliveries on all major finished** steel products quoted by local mills have extended from the low reached in November, but still are far from the peak reached last June or in succeeding summer months. Nevertheless carry-overs continue to mount.

Although the median delivery of four months existing Jan. 1 coincides with that of Oct. 1, the pattern among various products bears little resemblance to last fall. Efforts obviously are being made by WPB to balance the product mix by means of shuffling production directives in order to provide added space for those items farthest extended. However, tendencies in certain products, noticeably bars, sheets and strip, towards further extension of deliveries are so strong that difficulty will be encountered in preventing them from reaching nine month deliveries quoted on most flat rolled products last June.

Currently, would-be purchasers of hot rolled pickled sheets and strip would have great difficulty in placing any substantial tonnage for delivery earlier than August. Local mills insist that unless badly needed manpower is made available from some source, there is little possibility of improving this situation.

Galvanized sheets, consistently one of the most extended items, may find some relief through revision of first quarter tin plate production directives. Substitution of galvanized sheets for a portion of the tin plate originally scheduled by some mills, and in some cases use of electrolytic tinning lines for galvanizing, may drag quoted deliveries back two or three months from August dates now quoted. Easing sufficient to meet all demands relatively promptly is improbable, however, because of the tight sheet situation generally. Surprisingly, there are reports from the zinc trade that indicate increased consumption from various sources could create a tight situation there, although the seriousness of this worry undoubtedly is far less than many others confronting the steel industry.

Additional shipbuilding requirements for plates, provided they are not greater than the 2,000,000 tons mentioned for the first six months of 1945, probably can be absorbed by certain Eastern mills without seriously affecting the delivery lag in this category which has been shrinking since last summer. Two months' delivery is available for most plates, although some mills still are further extended. Only if plate demand again increases to such an extent that continuous mills are forced to resume a more substantial proportion of their production, will the situation become serious. Such a situation would, of course, throw the production of lighter gage products still further out of balance than it now is.

Although some two, three and four month openings still can be found for structurals, strip and cold rolled sheets, these are anchronisms rapidly being corrected, and, by the time this sees print, June delivery probably will be the earliest generally available. One mill, not in this district, reports its schedules filled on cold rolled strip until October, but this is not characteristic.

Although there have been heavy structural orders placed in recent weeks, the lengthening in deliveries is in part a sympathetic movement reflecting increased shell steel demand. Lengthening deliveries in carbon bars, particularly in the larger sizes, also shadow the zooming shell steel program, although deliveries in smaller sizes also have increased from two months ago. Deliveries quoted on larger size bars generally are only about a month longer than on the smaller sizes.

Only two items on the slate, popular size alloy bars and universal mill plates have been sufficiently inactive to resist buying pressure, although alloy bars have tightened noticeably from their Oct. 1 status.

Although "Z" allotments for civilian production under spot authorizations have become virtually worthless, there still exists feeling in some mill quarters that programmed essential civilian production, carrying regular CMP allotments, could be trimmed further without hurting the war effort. Insistence by essential civilian producers that they not be displaced by war business unless it is by directive has, some of the mills believe, made necessary the issuance of more directives than otherwise would be necessary. This, in turn, has contributed to the rapid mounting of carryovers. The carryover situation currently, however, still is far from the near chaos which it approached just before the continental invasion last spring.

NUMBER OF MONTHS DELIVERY DELAY

First of the month

Product	August	September	October	November	December	January
Sheared plates, narrow	7	8	6	3	4	2-5
Sheared plates, wide	5	4	3	3	3	2-5
Universal mill plates	5	5	4	3	3	2
Hot rolled sheets	6	7	7	1-3	3	4-5
Strip mill sheets	7	6	5	1-3	1-3	5
Cold rolled sheets	7	4	2	1-4	3-4	4-5
Strip	7	6	4	3	5	4-6
Large structurals	5	5	2	3	2	2-5
Small structurals	5	5	4	3	4	3-5
Carbon bars	7	6	5-8	3	3-4	5-6
Popular alloy bars	4	2-4	1	1-3	2-3	2
Median	6	5	4	3	3	4

American Iron & Steel Institute Capacity, Production and Shipments

STEEL PRODUCTS	Number of Companies	Items	Maximum Annual Potential Capacity, Net Tons	NOVEMBER, 1944 Production Net Tons	NOVEMBER, 1944 Production Per Cent of Capacity	NOVEMBER, 1944 Shipments (Net Tons) Total	NOVEMBER, 1944 Shipments (Net Tons) To Members of the Industry for Conversion into Further Finished Products	TO DATE THIS YEAR Production Net Tons	TO DATE THIS YEAR Production Per Cent of Capacity	TO DATE THIS YEAR Shipments (Net Tons) Total	TO DATE THIS YEAR Shipments (Net Tons) To Members of the Industry for Conversion into Further Finished Products
Ingots, blooms, billets, tube rounds, sheet and tin bars, etc.	50	1				719,942	220,201			8,014,948	2,628,561
Structural shapes (heavy)	10	2	9,179,250	310,772	44.3	312,365		3,479,104	42.8	3,493,087	
Steel piling	4	3		22,610		24,803		120,025		118,389	
Plates (sheared and universal)	26	4	16,883,220	958,192	69.2	938,720	39,177	12,057,181	78.0	11,741,862	597,745
Skelp	6	5				72,636	58,176			770,193	608,212
Rails—Standard (over 60 lbs.)	4	6	3,625,000	193,202	64.9	190,032		2,116,639	63.8	2,095,579	
—All other	6	7	526,000	14,024	32.5	14,450		173,349	36.0	179,014	
Splice bars and tie plates	13	8	1,747,260	58,680	40.9	61,662		717,900	44.9	735,177	
Track spikes	10	9	350,640	12,270	42.6	12,867		134,990	42.1	143,097	
Hot Rolled Bars—Carbon	39	10		716,880		586,286	87,423	8,005,342		6,566,916	894,033
—Reinforcing—New billet	15	11		69,492		66,236		488,700		510,807	
—Rerolled	14	12		4,931		8,241		63,444		75,460	
—Alloy	25	13		249,445		174,342	19,134	2,822,879		2,065,658	382,626
—Total	47	14	22,264,720	1,040,748	57.0	835,105	106,557	11,380,365	55.8	9,218,841	1,276,659
Cold Finished Bars—Carbon	24	15		150,884		147,470		1,644,942		1,635,519	
—Alloy	23	16		30,913		28,019		384,546		348,042	
—Total	30	17	2,940,510	181,797	75.3	175,489		2,029,488	75.4	1,983,561	
Tool steel bars	17	18	271,460	12,663	56.8	12,748		134,711	54.2	129,107	
Pipe and Tubes—Butt weld	16	19	2,162,520	122,189	68.9	120,662		1,318,764	66.6	1,315,675	
—Lap weld	8	20	842,200	51,090	73.9	48,605		532,003	69.0	527,936	
—Electric weld	10	21	1,299,900	66,906	62.7	67,928		750,585	63.1	745,304	
—Seamless	15	22	2,678,100	203,367	92.5	201,814		2,156,438	88.0	2,164,520	
—Conduit	7	23	187,000	6,548	42.7	6,351		56,738	33.1	56,965	
—Mechanical tubing	12	24	1,117,600	69,850	78.2	66,953		761,167	74.4	745,427	
Wire rods	27	25	7,059,470	390,962	67.5	107,781	37,443	4,245,171	65.7	1,266,823	408,865
Wire—Drawn	42	26	5,653,440	310,439	66.9	183,063	9,744	3,366,877	65.1	1,998,433	94,719
—Nails and staples	19	27	1,249,020	49,258	48.1	49,246		596,084	52.1	587,126	
—Barbed and twisted	15	28	548,390	21,553	48.1	21,091		233,512	46.7	231,066	
—Woven wire fence	16	29	1,106,200	34,010	37.5	33,958		352,942	34.9	349,851	
—Bale ties	12	30	152,500	5,344	42.7	5,932		70,068	50.2	70,958	
Black Plate—Ordinary	9	31				44,995	242			454,402	1,265
—Chemically treated	8	32	484,000	7,223	19.0	6,981		119,951	28.2	113,469	
Tin and Terne Plate—Hot dipped	9	33	3,718,850	178,416	58.5	157,848		1,826,731	53.7	1,827,473	
—Electrolytic	10	34	2,173,850	53,921	30.2	44,191		590,989	29.7	543,925	
Sheets—Hot rolled	29	35	19,536,820	1,160,823	72.4	530,244	33,998	11,771,063	65.8	5,904,196	270,710
—Cold rolled	13	36	7,234,260	369,615	62.3	200,819		3,500,193	52.9	1,882,322	
—Galvanized	18	37	2,892,130	134,380	56.6	136,281		1,257,522	47.5	1,248,933	
Strip—Hot rolled	23	38	7,117,390	215,986	37.0	140,356	19,679	2,461,557	37.8	1,572,837	247,563
—Cold rolled	35	39	2,879,310	104,953	44.4	99,585		1,111,389	42.2	1,043,090	
Wheels (car, rolled steel)	5	40	319,400	26,020	99.3	25,500		274,742	94.0	270,656	
Axles	6	41	408,170	11,501	34.3	12,573		178,210	47.7	174,564	
All other	5	42	168,790	3,416	24.7	2,951		43,872	28.4	42,818	
TOTAL STEEL PRODUCTS	154	43				5,686,527	525,117			63,761,216	6,134,299
Effective steel finishing capacity	154	44	64,722,000								
Per cent of shipments to effective finishing capacity	154	45				97.2%				97.3%	

During 1943 the companies included above represented 98.9 per cent of the total output of finished rolled steel products.

Domestic and Foreign Steel Requirement To Expand in Next Year

Washington

• • • Steel is going to be tight in the first quarter because of increased domestic requirements by the Army and foreign requirements of FEA.

While most essential programs will be met, WPB thinks there will have to be a great deal of rearranging and resolving of conflicts between programs. The sheet situation is complicated by necessity of rolling 100,000 tons of drum sheets for export to France to be made into jerry cans and 55 gal. drums. The landing mat program increased demand for 10 gage sheets by 25,000 tons and there are reports that the program may be increased to 200,000 tons in the second quarter.

WPB may soon have to decide whether the Army is going to have bombs or oil. The new increased bomb program is expected to conflict with pipe requirements. If both programs are reduced it is going to mean, WPB officials say, a general rearrangement

FEA recently submitted requirements for 558,000 tons of finished steel in almost every category. This has been reduced to a more realistic 120,000 tons. The only product which can be secured easily is reinforcing bars. Other products are expected to get directive treatment.

The need for fine gage wire rope bead wire and signal corps communication wire, has wire drawing facilities loaded to the hilt.

G.E. Plans to Build $4-5 Million Plant To Hire 1500 People

Ashtabula, Ohio

• • • Options on approximately 100 acres of land for the erection of a postwar plant costing between four and five million dollars, for the manufacture of refrigeration units, have been obtained here by the General Electric Co.

Complete details of the big project cannot be made public at this time, but the General Electric Co. recently authorized the announcement that the necessary land has been acquired and that plans are going forward for the erection of the plant which will employ about 1500 people from Ashtabula and the surrounding area.

Some indication of the size of the new enterprise may be had from the fact that the first main unit of the factory will cover about 15 acres under one roof; an additional eight acres under one roof will be covered by the second unit, making 23 acres in all, occupied by the two principal factory buildings.

The new plant will manufacture what the company terms home freezers and household refrigeration units. The home freezer applies to the complete freeze method, under which meats, fruits and vegetables are preserved at low temperatures for comparatively long periods of time.

Power from the Cleveland Electric Illuminating Co., water from the Ashtabula Water Works Co., and gas from the Lake Shore Gas Co. will be used in the new plant. Stone & Webster, a New York firm, has the general contract for the erection of the plant and will do the engineering. There will also be a number of subcontracts. The plant will be served by the Pennsylvania and New York Central Railroads.

Ford Gets More Contracts

Dearborn, Mich.

• • • Ford Motor Co. has received additional orders for approximately 30,000 universal carriers, light armored cars and jeeps, continuing schedules which would have ended next spring and summer.

The universal carriers will be produced at the Ford branch at Somerville, Mass., which is shipping the assemblies to the British under lend-lease.

Foundry Price Ceilings Listed

Washington

• • • As reported on page 99 THE IRON AGE Jan. 11 issue, dollar and cents ceiling prices at the foundry level have been established for small orders of malleable iron castings. They are as follows:

Weight Per Casting	Price Per Pound							
	1 to 3 Castings	4 to 9 Castings	10 to 24 Castings	25 to 49 Castings	50 to 99 Castings	100 to 249 Castings	250 to 499 Castings	500 to 1000 Castings
¼ lb. and under	$7.7025	$2.8675	$1.3550	$ .8500	$ .6300	$ .4650	$ .3700	$ .3050
Over ¼ to 1 lb.	2.4900	1.1150	.6650	.5075	.4125	.3275	.2575	.2250
Over 1 to 2 lbs.	1.2625	.6575	.4650	.3800	.3275	.2525	x	x
Over 2 to 4 lbs.	.7925	.4500	.3400	.2725	.2425	x	x	x
Over 4 to 8 lbs.	.5025	.3400	.2625	.2050	x	x	x	x
Over 8 to 15 lbs.	.3550	.2600	.2125	x	x	x	x	x
Over 15 to 25 lbs.	.2725	.2100	.1775	x	x	x	x	x
Over 25 to 50 lbs.	.2050	.1700	x	x	x	x	x	x
Over 50 to 80 lbs.	.1650	x	x	x	x	x	x	x
Over 80 to 100 lbs.	.1550	x	x	x	x	x	x	x
Over 100 to 200 lbs.	.1450	x	x	x	x	x	x	x
	Price Per Casting							
¼ lb. and under	$1.3479	$ .5018	$ .2371	$ .1488	$ .1103	$ .0814	$ .0648	$ .0534
Over ¼ to 1 lb.	1.5565	.6969	.4156	.3172	.2578	.2047	.1609	.1400
Over 1 to 2 lbs.	1.8938	.9563	.6975	.5700	.4913	.3788	x	x
Over 2 to 4 lbs.	2.3775	1.3500	1.0200	.8175	.7275	x	x	x
Over 4 to 8 lbs.	3.0150	2.0400	1.5750	1.2300	x	x	x	x
Over 8 to 15 lbs.	4.0825	2.9900	2.4438	x	x	x	x	x
Over 15 to 25 lbs.	5.4500	4.2000	3.5500	x	x	x	x	x
Over 25 to 50 lbs.	7.5953	6.3750	x	x	x	x	x	x
Over 50 to 80 lbs.	10.7250	x	x	x	x	x	x	x
Over 80 to 100 lbs.	13.9500	x	x	x	x	x	x	x
Over 100 to 200 lbs.	21.7500	x	x	x	x	x	x	x

Plant Ordered To Release Its Rates And Wage Structure

Chicago

• • • General American Transportation Corp. has been ordered to furnish a set of its piece work rates and wage structure in its U. S. plant at Chicago to the United Packing House Workers, local 237 (CIO) by the Sixth Regional War Labor Board.

In a dissenting opinion written by F. M. Gillies, industry panel member, industry members of the board declared that the complex incentive structures would confuse the union representatives and cause dissension and misunderstanding.

The majority opinion held, however, that "the union is entitled to know what such rates are. Because of their technical nature, posting them might create more of a problem than it would solve. But certainly those who must bargain for the employees and handle their grievances have a right to know what the existing rates are and how they apply.

"If grievances are raised by employees, because of alleged inequities, the union should thus be in a position to aid the management in absolving such grievances."

In the same directive, the board denied union requests for a general wage increase and liberalization of the company's sick leave plan; ordered the company to furnish each employee with a summary sheet for each pay period showing his piece work and day rate earnings.

New Hospital Cars Ordered

Chicago

• • • With imminent completion of prefabrication and subassembly contracts on patrol craft and landing ships by Pullman-Standard Car Mfg. Co.'s plant at 111th Street and Cottage Grove Ave. here, construction of 50 new hospital unit cars for the Army has commenced. Until war production required cessation of such activities, the facilities of the plant were utilized to produce light weight railway passenger car output. Current schedules call for launching of the last patrol craft escort before the end of January and the final landing ship, medium, during March. Final assembly and fitting operations still are in full swing at the company's Calumet Harbor yard.

Worker Applications Increase at Buffalo, But Shortage Stays

Buffalo

• • • Tightening of the draft rules resulted in a 50 per cent increase in the number of men applying for war jobs at U. S. Employment service offices in this district recently, according to Joseph D. Canty, WMC area director, and Leo A. Sweeney, district superintendent of the USES.

This increase, however, failed to provide more than a "handful of men for the area's 'must' plants" the manpower officials said, because most of these jobs are in heavy industry and the applicants, for the most part, either lacked the physical requirements or the necessary skill. The number of men needed in these "must" plants is approximately 2200, they added.

Canty said that all applicants, nevertheless, are being referred to war plants and are finding ready employment in the "critical" establishments—"those making items only slightly less urgently needed by the armed forces than the products of the 'must' plants." The critical plants need about 4800 men.

Then there are the "essential" activities, such as transportation, communications, grain and food handling, etc., which need 6500, making a total of 13,500 required in all three categories.

Sweeney declared he believed the solution to much of the shortage of labor might be found in importation of Jamaicans. Some already have been put to work here since the area war manpower committee voted a month ago to withdraw all objections to employment of such "imported" workers and to let the labor and management of each plant deal with the proposal independently.

As soon as housing arrangements are completed, several hundred more Jamaicans will be brought into the district.

So far, the Buffalo plant of the Acme Steel & Malleable Co. has employed 16 Jamaicans, the Carborundum Co. at Niagara Falls, 50, and Barden & Robson at Lockport, 12.

COMING EVENTS

- Jan. 22—Symposium in Magnetic Particle Testing, A.S.T.M. Philadelphia District Committee, Philadelphia.
- Jan. 24—18th Annual Mining Institute of the College of Mines, University of Washington, Seattle.
- Jan. 24-26—National Screw Machine Products Association, annual meeting, Milwaukee.
- Feb. 19-22—Annual meeting, Iron and Steel Division and Institute of Metals Division, A.I.M.E., New York.
- Feb. 26-March 2—A.S.T.M. 1945 Committee Week, Spring Meeting, Pittsburgh.
- March 19-20—American Society of Tool Engineers, Cleveland.
- March 19-22—Machine and Tool Progress Exposition, American Society of Tool Engineers, Cleveland.
- April 4-6—SAE National Aeronautic Meeting, New York.
- April 12-14—Electrochemical Society, Inc., Philadelphia—Atlantic City Congress, Atlantic City, N. J.
- April 26-27 — Annual Conference, Open-Hearth Steel Committee and Blast Furnace and Raw Materials Committee, Iron and Steel Division, A.I.M.E., Chicago.
- April 30-May 4 — American Foundrymen's Association, Detroit.

Production of Open Hearth, Bessemer and Electric Steel Ingots and Steel for Castings

Based on Reports by Companies which in 1943 made 98.3 Per Cent of the Open Hearth, 100 Per Cent of the Bessemer and 87.9 Per Cent of the Electric Ingot and Steel for Castings Production.

Source: American Iron & Steel Institute

1944

Period	Estimated Production—All Companies: Open Hearth Net Tons*	Open Hearth Per Cent* of Capacity	Bessemer Net Tons*	Bessemer Per Cent* of Capacity	Electric Net Tons*	Electric Per Cent* of Capacity	Total Net Tons*	Total Per Cent* of Capacity	Calculated* Weekly Production all Companies (Net Tons)	Number of Weeks in Month
January	6,769,438	97.2	439,551	85.4	377,751	83.3	7,586,740	95.6	1,712,582	4.43
February	6,410,338	98.5	409,781	85.2	368,555	87.0	7,188,674	96.9	1,736,395	4.14
March	6,976,450	100.1	455,368	88.5	388,408	85.7	7,820,226	98.5	1,765,288	4.43
1st Quarter	20,156,226	98.6	1,304,700	86.4	1,134,714	85.3	22,595,640	97.0	1,738,126	13.00
April	6,768,895	100.3	437,517	87.8	362,118	82.5	7,568,530	98.5	1,764,226	4.29
May	6,860,532	98.5	438,980	85.3	380,960	84.0	7,680,472	96.8	1,733,741	4.43
June	6,452,087	95.6	418,117	83.9	347,028	79.0	7,127,232	93.9	1,682,338	4.29
2nd Quarter	20,081,514	98.1	1,294,614	85.6	1,090,106	81.9	22,466,234	96.4	1,726,844	13.01
1st 6 months	40,237,740	98.4	2,599,314	86.0	2,224,820	83.6	45,061,874	96.7	1,732,483	26.01
July	6,723,994	96.7	415,593	80.9	334,710	74.0	7,474,297	94.4	1,691,017	4.42
August	6,691,262	96.0	429,637	83.5	348,901	77.0	7,469,800	94.1	1,686,185	4.43
September	6,464,631	95.6	398,028	80.0	330,837	75.2	7,193,496	93.4	1,680,723	4.28
3rd Quarter	19,879,887	95.8	1,243,258	81.5	1,014,448	75.2	22,137,593	93.7	1,686,031	13.13
9 months	60,117,627	97.5	3,842,572	84.5	3,239,268	80.8	67,199,467	95.7	1,716,900	39.14
October	6,822,670	97.5	420,108	81.6	335,526	73.7	7,578,304	95.1	1,710,678	4.43
November	6,556,142	96.7	403,889	81.0	298,503	67.7	7,258,534	94.1	1,691,966	4.29
December	6,502,980	96.0	390,979	75.9	361,185	86.3	7,255,144	94.2	1,641,435	4.42
4th Quarter	19,938,213	99.1	1,345,442	87.9	1,157,581	93.1	22,441,236	98.0	1,707,357	13.14
2nd 6 months	39,842,093	99.0	2,777,391	90.8	2,330,431	93.7	44,949,915	98.2	1,711,074	26.27
Total	78,621,804	98.9	5,625,492	89.1	4,589,070	96.7	88,836,366	98.1	1,703,004	52.14

Note—The percentages of capacity operated are calculated on weekly capacities of 1,572,755 net tons open hearth, 116,182 net tons Bessemer and 102,350 net tons electric ingots and steel for castings, total 1,791,287 net tons; based on annual capacities as of Jan. 1, 1944, as follows: Open hearth 82,223,610 net tons, Bessemer 6,074,000 net tons, Electric 5,350,880 net tons.

* Revised January through March, 1944.

1943

Period	Estimated Production—All Companies: Open Hearth Net Tons*	Open Hearth Per Cent* of Capacity	Bessemer Net Tons*	Bessemer Per Cent* of Capacity	Electric Net Tons*	Electric Per Cent* of Capacity	Total Net Tons*	Total Per Cent* of Capacity	Calculated* Weekly Production all Companies (Net Tons)	Number of Weeks in Month
January	6,576,788	97.8	478,161	85.9	369,573	95.5	7,424,522	96.8	1,675,964	4.43
February	6,031,605	99.3	447,810	89.1	345,189	98.8	6,824,604	98.5	1,706,151	4.00
March	6,787,902	100.9	503,565	90.4	383,111	99.0	7,674,578	100.0	1,732,410	4.43
1st Quarter	19,396,295	99.3	1,429,536	88.4	1,097,873	97.7	21,923,704	98.4	1,704,798	12.86
April	6,510,824	99.9	482,478	89.5	380,401	101.5	7,373,703	99.3	1,718,812	4.29
May	6,669,703	99.1	482,424	86.6	397,564	102.7	7,549,691	98.4	1,704,219	4.43
June	6,202,889	95.2	453,663	84.1	382,801	102.1	7,039,353	94.8	1,640,875	4.29
2nd Quarter	19,383,416	98.1	1,418,565	86.8	1,160,766	102.1	21,962,747	97.5	1,688,144	13.01
1st 6 months	38,779,711	98.7	2,848,101	87.6	2,258,639	99.9	43,886,451	98.0	1,696,423	25.87
July	6,556,794*	96.8	466,345	90.6	384,737	91.9	7,407,876	96.2	1,675,990	4.42
August	6,700,118	98.7	484,847	94.0	401,499	95.7	7,586,464	98.3	1,712,520	4.43
September	6,646,968	101.4	480,757	96.4	386,614	95.4	7,514,339	100.7	1,755,687	4.28
3rd Quarter	19,903,880	99.0	1,431,949	93.6	1,172,850	94.4	22,508,679	98.4	1,714,294	13.13
9 months	58,683,591	98.8	4,280,050	89.5	3,431,489	98.0	66,395,130	98.1	1,702,439	39.00
October	6,892,029	101.6	513,585	99.5	408,503	97.4	7,814,117	101.2	1,763,909	4.43
November	6,543,204	99.6	440,878	88.2	387,893	95.5	7,371,975	98.6	1,718,409	4.29
December	6,502,980	96.0	390,979	75.9	361,185	86.3	7,255,144	94.2	1,641,435	4.42
4th Quarter	19,938,213	99.1	1,345,442	87.9	1,157,581	93.1	22,441,236	98.0	1,707,857	13.14
2nd 6 months	39,842,093	99.0	2,777,391	90.8	2,330,431	93.7	44,949,915	98.2	1,711,074	26.27
Total	78,621,804	98.9	5,625,492	89.1	4,589,070	96.7	88,836,366	98.1	1,703,804	52.14

Note—The percentages of capacity operated in the first 6 months are calculated on weekly capacities of 1,518,621 net tons open hearth, 125,681 net tons Bessemer and 87,360 net tons electric ingots and steel for castings, total 1,731,662 net tons; based on annual capacities as of January 1, 1943, as follows: Open hearth 79,180,880 net tons, Bessemer 6,553,000 net tons, electric 4,554,980 net tons. Beginning July 1, 1943, the percentages of capacity operated are calculated on weekly capacities of 1,531,789 net tons open hearth, 116,494 net tons Bessemer and 94,667 net tons electric ingots and steel for castings, total 1,742,950 net tons; based on annual capacities as follows: Open hearth 79,867,450 net tons, Bessemer 6,074,000 net tons, Electric 4,935,960 net tons.

* Revised January through December, 1943.

UNARMED SUPERFORTRESS: *Postwar hopes of Boeing Aircraft are closely tied to this commercial version of the heavy bomber. Although now in cargo use by the Army Air Forces, this prototype will accumulate the operating experience needed to prepare it for commercial use.*

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American Foundrymen Chapter at Portland First in Northwest

Portland, Ore.

• • • Formation here of a chapter of the American Foundrymen's Association has been approved by the Association board of directors, and the organization meeting of the new group was held Jan. 19.

The chapter, the first foundry organization in the Pacific Northwest, was sponsored by a committee headed by William R. Pindell, Northwest Foundry & Furnace Works, Portland, and including Nate Weinger, Western Foundry Co., Portland; E. G. Huffschmidt, Western Foundry Co., Portland; A. G. Hobson, Miller & Zehrung Chemical Co., Portland; Arthur Prier, Oregon Brass Works, Portland; and Frank Miller, Western Supply Co., Portland.

The chapter is the 29th for the association nationally and the third on the Pacific Coast. The northern California chapter in the San Francisco area was organized in 1935 and the southern California chapter in the Los Angeles area, 1937. The 28th AFA chapter was officially established at Columbus, Ohio, Dec. 20.

At a "guinea pig" meeting arranged by the local committee here Nov. 3, L. P. Robinson, Werner G. Smith Division, Archer-Daniels-Midland Co., Cleveland, discussed "Foundry Core Production Problems."

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Canadian Production Undergoes Revisions

Toronto

• • • Revisions of a broad nature are being made in Canadian war production, and for the next few months much of the activity in war plants will center on shells and ammunition. Already a number of British contracts with Canadian firms have been withdrawn, with no indication of renewal, and other cancellations on a wide scale are expected without further delay. United States orders placed with Canadian companies recently for shells and munitions will replace some of the British business although considerable retooling will be necessary to swing to U. S. standards.

Sharp reduction in aircraft production in Canada has been announced and there has been a heavy lay-off of workers in the government-owned company at Malton, and at Fleet Aircraft at Fort Erie, and word has just been received to the effect that four aircraft plants at Winnipeg are laying off hundreds of workers and cutting operations. It appears that future aircraft production in this country will be associated with non-war activities and already large contracts have been placed in this connection.

Thousands of workers have been dropped from payrolls of the Canadian shipbuilding industry in the past few months, while small arms plants, and plants producing Bren guns, anti-aircraft guns and similar lines are down to less than 25 per cent of their maximum production schedules.

AIMME Meeting Cancelled

New York

• • • Pursuant to the request of Hon. James F. Byrnes, Director of War Mobilization and Reconversion, the board of directors of the American Institute of Mining and Metallurgical Engineers has cancelled their annual meeting scheduled for Feb. 19-22, Hotel Pennsylvania, New York.

In accordance with the institute's by-laws, the annual business meeting will be held on Feb. 20, followed by a directors' dinner, at which Harvey S. Mudd, the new president, will be inducted.

Venezuelan Ore Exploited

Washington

• • • Commercial exploitation of iron ore deposits in Venezuela is to be started as soon as construction of installations can be completed and final transportation details arranged, according to the Department of Commerce.

Ore reserves in the concession which is to be operated are estimated at from 60,000,000 to 100,000,000 tons of which much can be mined without stripping waste rock.

Surplus Inventories And Sales Announced

Washington

• • • The Surplus Property Board announced on Jan. 9, November sales of various surplus properties together with stocks of various categories on hand Nov. 30. Inventories and sales of interest to the iron, steel and metal working industries made by Treasury Procurement and RFC follow:

Item	Inventories	Sales
Construction, mining excavating and related machinery (TP)	$5,729,000	$ 409,000
Metal end products (except machinery and equipment) (TP)	4,094,000	243,000
Electrical machinery (TP)	1,961,000	61,000
and apparatus (RFC)	3,432,000	106,000
Metalworking machinery (RFC)	43,550,000	1,758,000
Steel (RFC)	19,085,000	1,008,000
Fabricated metal basic products (RFC)	2,220,000	91,000

Impending Scrap Shortage May Result in Closing of Steel Mills

Cincinnati

• • • One of the many spokesmen of the Army, Navy, Maritime Commission, WPB, OPA, RFC and other government agencies to address the annual convention of the Institute of Scrap Iron and Steel, Rear Admiral H. L. Merring, deputy chief, Procurement and Material for Industrial Readjustment, USN, said that some steel mills may be forced to close down their production soon if scrap is not forthcoming. Navy contract terminations to the end of 1944 amounted to $3.5 million, the Admiral said, and these represent modifications of the procurement program to take advantage of strategic and technological developments of the war. Navy procurement will not be affected by VE day.

Scrap constitutes 80 per cent of contract termination inventories, it was said by Admiral Merring, and this is handled through the 18 district offices of the Navy Material Redistribution and Disposal Administration headed by Rear Admiral W. A. Buck in New York. These offices approve the retention or sale of scrap by contractors and also handle the direct sale of scrap at plants and Navy activities. Except when subject to WPB allocation, Admiral Merring said, scrap will be sold through normal trade channels. Plants must be cleared in 60 days, and scrap will be sold by the Navy "as is—where is" for classification and resale by the trade. Sales of scrap will be made by the Navy in small lots in order that all classes of dealers can purchase. Scrap is sold generally by competitive bidding and therefore a scrap warranty is not required. Even though prices are depressed by the approaching end of the war, Admiral Merring said, Navy scrap would be sold at representative market prices by means of competitive bidding.

The Army Air Forces sold during December, 14,000 gross tons of steel scrap and 16 million lb. of aluminum scrap through six district offices of the Air Technical Service Command, according to Col. E. W. Rawlings, chief, Readjustment Division of that command. These figures represent scrap generated by cost-plus-fixed-fee contractors; they do not include scrap from fixed-price contracts. Col. Rawlings said that there is nothing incompatible about contract terminations and war production at the same time and pointed out that the uncertainties of war prevent advance knowledge of required terminations or readjustments of production schedules.

Army Ordnance sells 100,000 tons of ferrous scrap monthly through its field salvage officers, it was said by Lt. Col. Lowell Thomas, deputy chief, Redistribution and Salvage Section, Production Service Branch, Ordnance Department, U. S. Army. The Army Third Service Command handled 75,000 tons of overseas battle scrap last year through the port of Baltimore, it was reported by Major W. S. Whitehead, director, Property Disposal Division of that command.

Invitations to bid on the storage of scrap were sent out last week to dealers in nine areas located in the Fifth Service Command, it was revealed by Col. Wm. Dunham, Jr., deputy chief of staff of that command.

The role of the Reconstruction Finance Corp. and its subsidiary Metals Reserve Co. in handling scrap and other surplus materials was described by several speakers. Senator Charles B. Henderson, chairman of the board, RFC, and president of Metals Reserve Co., said that no one knows how much property will be declared surplus during and after the war. While sales of surpluses will be decentralized through 23 RFC agencies, inquiries for scrap, machine tools and other materials should be directed to the nearest RFC office. Henry W. Cornell, Jr., vice-president of Metals Reserve Co., said that RFC agencies are to be considered as sales organizations connected by a nationwide teletype system at the service of business.

During the period of market weakness which started last summer it became apparent that MPR 4, a regulation which had been designed primarily for a seller's market, became excessively restrictive in a buyer's market, according to Warren M. Huff, price executive, Iron and Steel Branch, OPA. This called for modification of certain provisions of the regulation, but the basic regulation will be continued for the duration of the war. By modification of the regulation when required, the OPA intends to keep scrap flowing to the mills so as to prevent shutdown of open hearth furnaces for lack of scrap.

Mr. Huff said that during the war the forces acting to increase prices of pig iron and iron ore would serve to encourage competition by the scrap industry. However, technological developments in the steel industry have emphasized the importance of analysis, so in order to take advantage of this improved market postwar, it will be necessary for the scrap trade to clean up its products and adhere more closely to standards of quality.

Scrap Group Elects

Cincinnati

• • • The following officers were elected at the recent convention of the Institute of Scrap Iron & Steel, Inc.: Edwin C. Barringer, president; Philip W. Frieder, Cleveland, first vice-president; William J. Wolf, Hamilton, Ohio, second vice-president; Walter Erman, Chicago, re-elected secretary, and Samuel G. Keywell, Detroit, re-elected treasurer.

Urges Yards Be Cleaned Up

Chicago

• • • Auto wreckers were urged to clean up their yards disposing of as much material as possible for scrap, by Harold Weinstein, Calumet Iron & Steel Co., speaking before the National Auto Wreckers Association convention here recently. Recognizing the place of the wreckers in parts supply, he also pointed out that the wreckers would be flooded with material, probably worth a great deal less, with the end of the war. Therefore, he emphasized, nothing is to be gained by holding scrap as long as ceiling prices are maintained. In response to questions, he saw little likelihood that ceiling prices would be raised.

Women Workers Gain in Steel

New York

• • • A total of 40,000 women now are employed by United States Steel Corp. and its subsidiaries, *U. S. Steel News* disclosed recently. Fifteen thousand are in office occupations and 25,000 directly engaged in production.

The January issue of the employee magazine is dedicated to the "All American" girls who have entered the steel industry to fill the places vacated by brothers, husbands or sweethearts in the armed forces.

Industrial Briefs . . .

• CIPHERITIS—American Manganese Steel Division of American Brake Shoe Co. is spending more than $75,000 for alterations to buildings at its Chicago Heights, Ill., plant and purchase of new equipment to increase its capacity for the manufacture of extruded coating welding electrodes there. An item in Dec. 14 IRON AGE placing the expenditure at $75,000,000 was in error.

• POSTWAR PLANS—An appropriation of approximately $350,000 for postwar improvements including 12 new modern type smelters, was announced recently by the directors of Ferro Enamel Corp., Cleveland. They will be equipped with the latest automatic control devices and each two units will have an automatic dryer.

• CELEBRATES ANNIVERSARY—Sixtieth anniversary of the founding of Harnischfeger Corp., Milwaukee, is celebrated in a commemorative booklet entitled, "Three Score Years of Free Enterprise." The booklet describes the growth of the company and its products in the light of new and expanding industrial markets.

• EXPORT STIMULUS — 17,000 copies of a brochure entitled "World Markets—A Challenge and an Opportunity for the Middle West" are being distributed to manufacturers throughout the Middle West by the Chicago Association of Commerce.

• BUYS COMPANY—Pullman Inc. has announced that it will acquire for cash the entire outstanding stock of the M. W. Kellogg Co. of Jersey City, N. J., for many years a leading firm in the field of petroleum and chemical engineering. The Kellogg Co. will be operated as a separately incorporated member of the Pullman group of companies.

• PRODUCTION RECORDS — New records in steel production have been made for the third consecutive year by the Jones & Laughlin Steel Corp., Pittsburgh. Among the outstanding records are those made at the Pittsburgh Works, Aliquippa Works, Otis Works, Cleveland and the McKeesport, Pa., Works.

• DISTRIBUTION SETUP—Following expiration of a business contract between General Motors and the Gray Marine Motor Co., Detroit, distribution of products of the Detroit Diesel Engine Division will henceforth be handled directly by the division, through its own engineering distribution and maintenance departments.

• BUYS SITE—Ford Motor Co., Dearborn, Mich., has purchased an industrial site to build a service parts building at Des Moines, Iowa. The cost will be approximately $700,000.

• NEW COMPANY—Gyrocast Sales & Engineering Co., Youngstown, Ohio, which will engineer and sell equipment for making steel castings by the centrifugal method, has been organized by Jack Trantin, president of Youngstown Alloy Casting Corp. The company will operate under patents held by him.

• ELECTS MEMBERS—Five new members from the steel and foundry industries have been elected by the Controllers Institute of America. They are: Forrest L. Grossman, Chicago Bridge & Iron Co.; Charles S. Herbert, Enterprise Engine & Foundry Co., San Francisco; Marshall W. Sheridan, U. S. Steel Products Co., New York; Milo F. Snyder, Ampco Metal, Inc., Milwaukee, and Charles R. Tuckerman, Oberdorfer Foundries, Inc., Syracuse.

• PROFITS LOWER—Chain Belt Co., Milwaukee, in its annual statement for the year ending Oct. 1, showed a net profit of $828,968 for 1944 as against $863,625 for the previous period.

Jones Reports Status Of Metals Reserve Co.

Washington

• • • **Total commitments** at the end of the year of $5,174,000,000 for the purchase of strategic and critical minerals have been made by RFC through the Metals Reserve Co., Secretary of Commerce Jesse Jones has announced. Of this amount $2,150,000,000 has been disbursed and $2,149,000,000 canceled or assigned to industry or FEA. Begun in 1940 these purchases have covered 50 critical materials coming from 51 foreign countries, 38 states, Alaska and the Philippines. Sales have been principally to industries engaged in war production and have amounted to $1,313,000,000. Stockpiles on hand cost $538,600,000 and in addition, the company has assets largely in the nature of advances to contractors, other receivables, and mining equipment and supplies in the amount of $67,800,000.

Because a great many of the materials have been bought at more than ceiling prices, losses through sales within OPA levels have been $26,500,000. Losses through subsidizing domestic production of copper, lead and zinc from marginal mines have aggregated $162,800,000. Premium payments under this subsidy have been made in connection with the production of 3493 mines.

Surplus Standards Book Gets Four Additional Parts

Washington

• • • **The Surplus Property Board** has announced that a pamphlet containing Sections XII, XIII, XIV and XV of the Handbook of Standards for Describing Surplus Property is now available at the Superintendent of Documents at a price of 10c a copy. These sections cover the following classes of property: XII, Railroad Transportation Equipment; XIII, Aircraft and Aircraft Components; XIV, Ships, Small Water Craft and Marine Mechanical Equipment; and XV, Motor Vehicles, Tractors and Miscellaneous Transportation Equipment.

It was emphasized that this publication is not a list of surplus property that is available for sale. The Handbook of Standards for Describing Surplus Property was undertaken by WPB to furnish sufficient information in commercial terms to allow a surplus property disposal agency to arrange for resale without calling upon the owning agencies for additional items of description.

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San Diego, Calif. ..... Victor Equipment Co.
San Francisco, Calif. ..... Victor Equipment Co.
Seattle, Wash. ..... J. E. Haseltine & Co.
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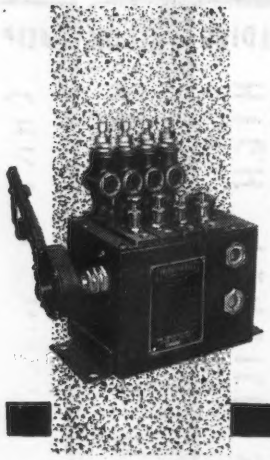

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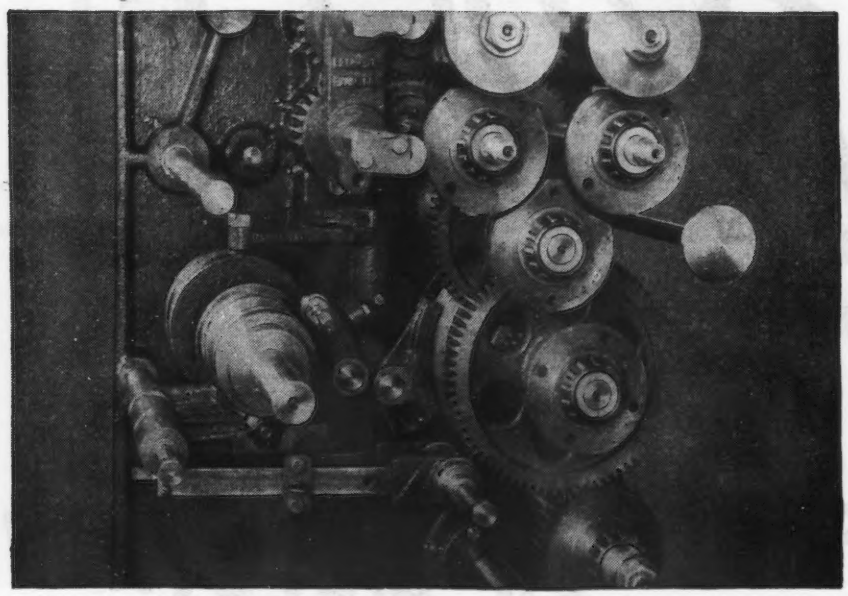


W-21 Torrington Coiler, with Front Housing removed

HELPS TO GREATER ACCURACY *in Spring Coiling*

No. 11 Bearings and their Care

Timken tapered roller bearings are used at a number of points on Torrington Spring Coilers, adjustably mounted so that the machine's inherent high degree of accuracy may be maintained indefinitely. For maximum accuracy, such bearings should operate with a slight preload.

Standard ball bearings, SKF self-aligning ball bearings and Torrington needle bearings are also used. Bronze bearings are used at other points where their use is practical.

Correct, regular lubrication of all bearings is a necessity. Timken, SKF and ball bearings should receive five or six shots from a grease gun each month. Needle bearings should be greased lightly, weekly. Overloading anti-friction bearings with grease may cause over-heating. Bronze bushings should receive two or more shots every other day. More detailed lubrication instructions are included in the operating instruction manual supplied with every Coiler.

February 15th—*Wire Feed Mechanism (Clutch Type)*

THE TORRINGTON
MANUFACTURING COMPANY
TORRINGTON, CONNECTICUT

Pilotless Airplane Materials Described In Greater Deta

New York

• • • As the appendix "flying bomb rained heavily on Allied troops in th . . . . sector" becomes almost stand ard in the news communiques, a mor complete technical description is a riving via the British press, where i is now an acknowledged "brillian technical achievement."

In typical German fashion, th pilotless airplanes were carefully de signed with the production enginee in mind, with every possible simplifi cation practiced for ease of produc tion. The control mechanism is th only exception to this rule, where th gyros make the installation compara tively complicated.

By an aviation engineer's termin ology it is a small midwing cantilever monoplane driven by a reaction unit of the simplest design. The twenty-one foot fuselage is built in six sections, the nose, the warhead, the fuel tank, the compartment containing the two compressed air bottles, and a tail portion in two sections containing the control mechanism.

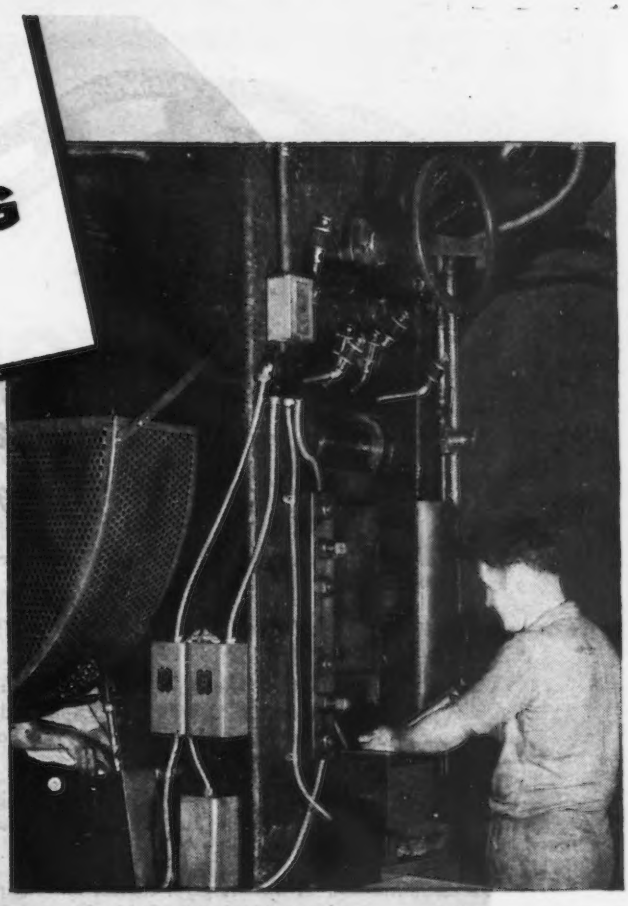
The war-head is made from welded mild-steel sheet of about 14 gage in thickness, a construction which permits a maximum weight of explosive to be carried.

As the fuel is subjected to a pressure of 100 lb./sq. in. to feed the power unit, the tank is of quite heavy construction and is made from mild-steel sheet of about 12 gage in thickness. The compartment aft of the tank which houses the air-bottles is welded to it to make a single unit.

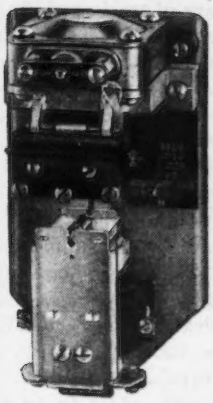
An interesting form of construction has been adopted for the bottles themselves. Each one is a spherical shell, made by welding together two mild-steel hemispherical pressings, and is bound externally by what appears to be 16 gage piano-wire under tension. The wire may be in three or four layers in twin bands of about 1½ in. in width, fixed with soldered, tinned-steel clips. The two bottles are coupled together and are in effect, one container. Proof testing is carried as high as 225 atmospheres and an hydraulic test of 3000 lb./sq. in. has been applied in England without causing failure. Air is compressed into the bottles at the remarkably high pressure of 150 atmospheres, which is reduced through valves to a working pressure of 100 lb./sq. in.

In the tail section of the fuselage

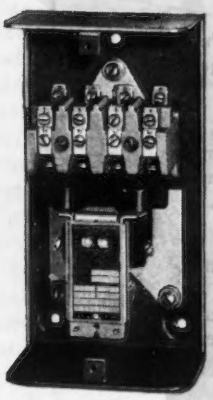
SQUARE D HEAVY DUTY CONTROL & TIMING RELAYS



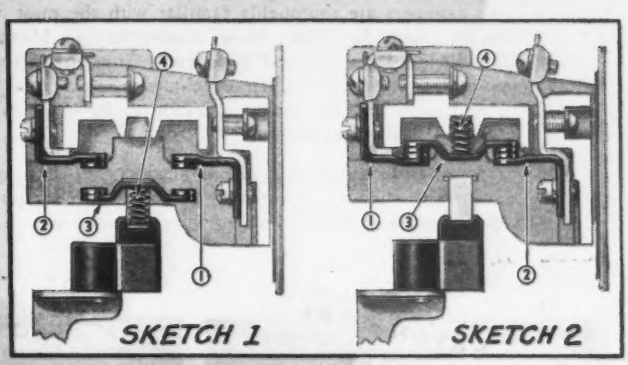
"Naturals" for reconverting or modernizing electrical control because they're designed for simplicity of operation and flexibility of application.



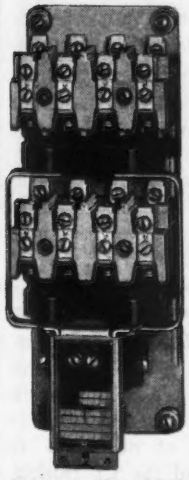
Class 9050 timing relay for .2 to 180 seconds delay



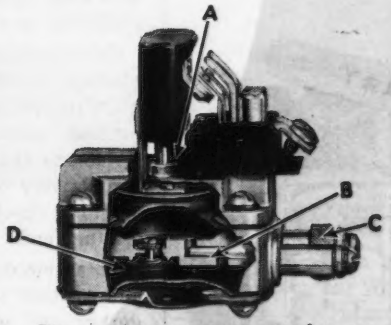
Class 8502 Type R four pole relay.



Sketches show how any pole of a Type R relay can be changed from normally open to normally closed (or vice versa) without additional parts. When parts numbered 1, 2, 3, and 4 in sketch 1 are removed and reassembled as in sketch 2, the contact is changed from normally open to normally closed.



Eight pole Class 8502 Type R relay.



Timer mechanism cutaway showing construction and method of operation. Spring action (A) moves contact member as quickly as air can transfer from lower to upper chamber through the restricted orifice (B). Turning the knurled wheel (C) regulates amount of restriction. A check valve (D) allows instantaneous resetting.

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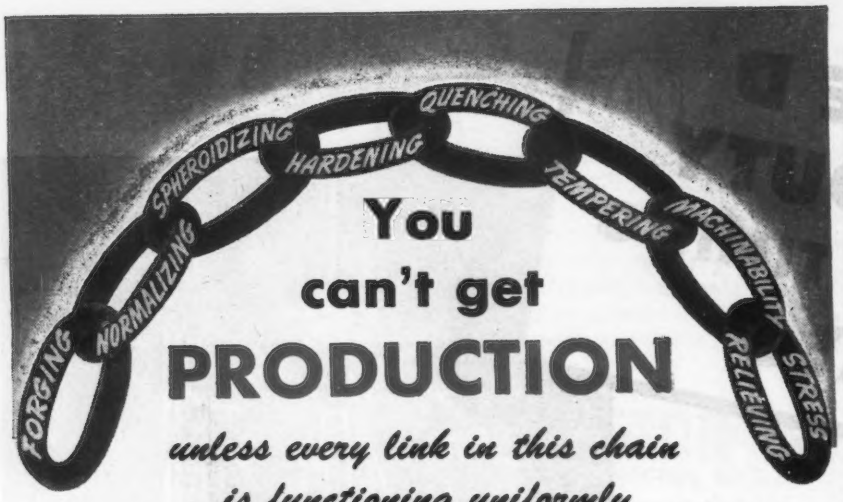

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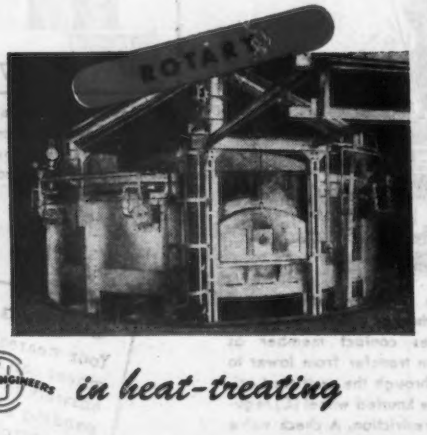

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is carried the automatic pilot, w three air-driven gyroscopes and height and range-setting contr Electrical gear is also mounted in t section. The tail is a single unit is taken right through the fusela On the top of it are mounted the t pneumatic servo-motors operating rudder and elevators. Detacha bolted-on panels give access to mechanism in this section. The unit is spot-welded to the tail of fuselage.

The war head is joined to the fr of the fuel tank and the tail port to the rear of the air-bottle compa ment by four large external bolts, that the fuselage may be said to c sist of three main portions, each co prising two sections.

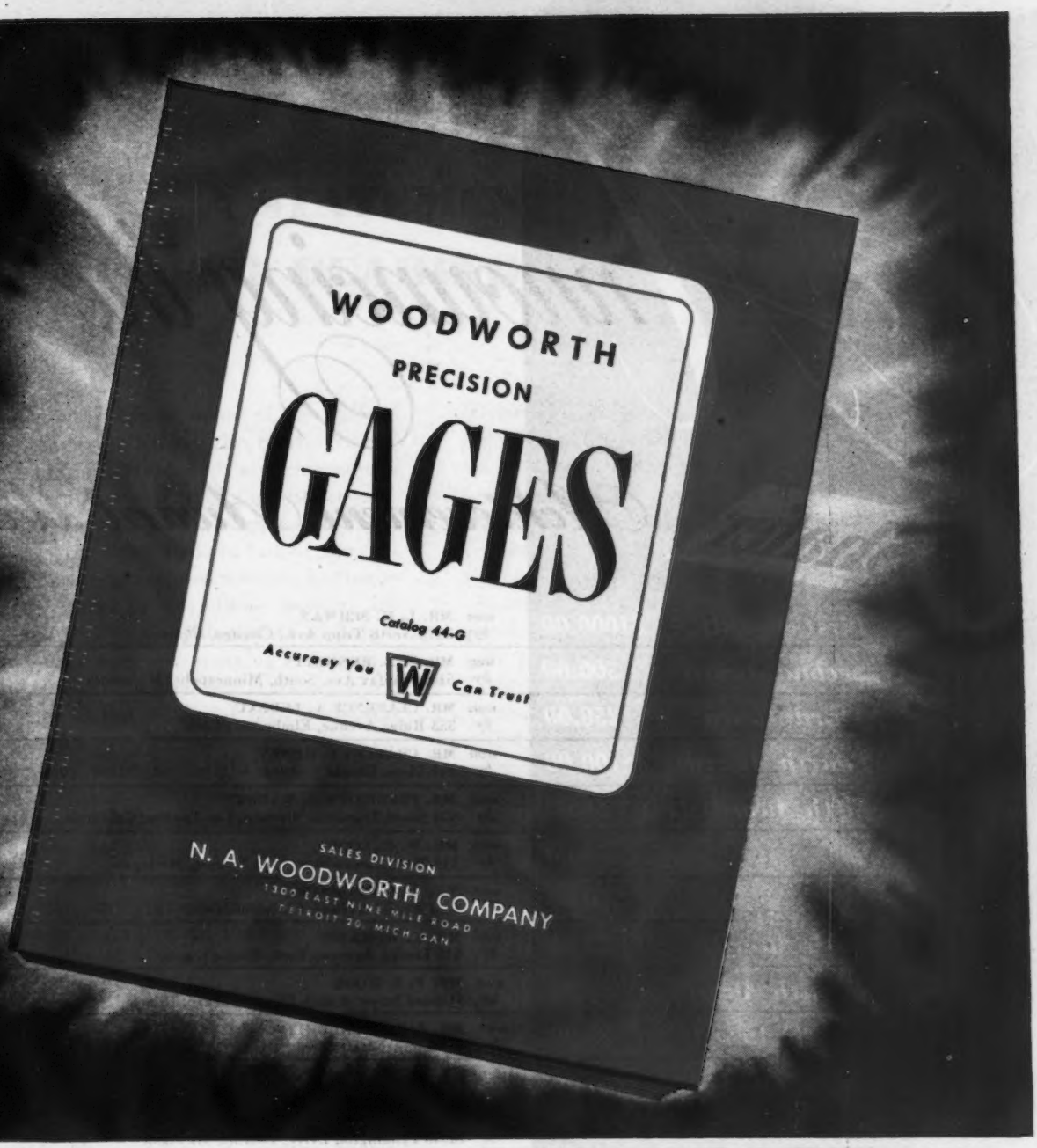
The wings are built as separ units and are of mild-steel sheet sp welded throughout. The position the spar coincides with the maxim thickness of the airfoil section at point about 25 per cent of the cho from the leading-edge. Flanged she metal ribs constitute the inter structure of the wing and there no stringers or other spanwise st feners. The ribs are simple pressin of about 22 gage material wi flanged lightening holes, one h being of clearance size to admit t spar. The tubular spar is push through a tubular housing about 5/ in. in thickness, which is welded in the fuel tank section of the fuselag This spar is a single piece of sea less steel tube of about 12 gage w thickness and 4¼ in. in diameter.

In manufacturing the wing the sk plating, which is approximately gage in thickness, is made in top a bottom sections, which are spo welded to the top and bottom flang respectively of alternate ribs and shallow, sheet webs at the nose a trailing ends of the ribs.

To assemble the wing structure to and bottom sections are brought to gether and welded along these pr jecting lips of the two webs, with th result that a strong box section obtained. The wing is completed b the attachment of nose and trailin edge plating and the tip fairing. E ternally the finish is completely flus all joints being butted.

There is no direct attachment to th spar, which is, of course, mounted the fuselage. The wings are, in fac not assembled until shortly befo launching, when they are slid on t the spars and bolted to the fuselag

The engine itself is of extreme simple and ingenious character, co sisting of a vertical grille mounted



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Fourth Award:	100.00	won by	MR. CHARLES F. HENRY Belvidere, Illinois
Fifth Award: (Tie)	50.00	won by	MR. FREDERICK C. WARREN 934 South Dunsmuir Avenue, Los Angeles, California
	50.00	won by	MR. W. E. COOK 110 West Alexandrine Ave., Detroit, Michigan
	50.00	won by	MR. J. M. BRUENING 6531 Euclid Avenue, Cleveland, Ohio
Sixth Award:	25.00	won by	MR. H. W. HAMM 515 Linden Avenue, York, Pennsylvania
Seventh Award:	25.00	won by	MR. F. J. WOOD Halsted Street & 48th Place, Chicago, Illinois
Eighth Award:	25.00	won by	MR. J. E. McLAUGHLIN 55 Mount Forest Street, Berlin, New Hampshire
Ninth Award: (Tie)	25.00	won by	MR. G. R. TREMOLADA 4439 Circleview Boulevard, Los Angeles, California
	25.00	won by	MR. EUGENE E. LANDAHL 18946 Pennington Drive, Detroit, Michigan
Tenth Award: (Tie)	25.00	won by	MR. E. E. VAN DYKE 14954 Greenleaf Street, Van Nuys, California
	25.00	won by	MR. J. B. DAX 2633 South Michigan Avenue, Chicago, Illinois
	25.00	won by	MR. C. J. KOSTBADE 2633 South Michigan Avenue, Chicago, Illinois
	25.00	won by	MR. H. C. POLLITZ Cedar Rapids, Iowa
	25.00	won by	MR. ROBERT F. PLUMB Cedar Rapids, Iowa

have been selected as the winners, in the amounts hievement Awards which were instituted in May losed September 1st, 1944. The winning entries llowing panel of well-known judges after careful ation of all entries.

afer Achievement Awards Competition

Chemistry, recognized ring design.

Mechanical Engineering gy. Widely

CHARLES A. NASH, Associate Professor Electrical Engineering, Illinois Institute of Technology. An authority of broad practical experience in Electrical and Mechanical Engineering.

ARTHUR H. WILLIAMS, Vice-President, in charge of Engineering, Shafer Bearing Corporation.

A STATEMENT BY
THE SHAFER BEARING CORPORATION

EIGHT months ago, as many of the readers of this magazine know, the Shafer Bearing Corporation established an Achievement Awards Competition, entries for which closed September 1st, 1944. The purpose of these awards was to bring to light out of the tremendous technical progress America has made under the stress of war, those especial advances that had to do with the art of designing, manufacturing and applying anti-friction bearings. It is clear that the years ahead are a challenge to the industrial sagacity of this country. New standards of machine and process efficiency must be sought and found . . . for their effects will reverberate and echo throughout a world that is starvation-hungry for durable and consumer goods. Certainly modern machines would be impossible without modern anti-friction bearings. By the same token . . . maximum machine efficiency cannot be gained in the absence of maximum bearing efficiency.

Because of the truly strategic and central position that the unique Shafer bearing principle occupies in crucial portions of industry, because Shafer Bearings have increasingly underwritten industrial efficiency for more than a quarter of a century, it became Shafer's responsibility to search out *every* possible source of improved bearing performance.

Hence the announcement of the Shafer Achievement Awards eight months ago in magazines of national scope reaching engineers and technical men on every level of activity . . . theoretical, developmental and practical. The response has been little short of amazing. From the entries that poured in Shafer has gleaned important ideas that we—and the *impartial* panel of judges—believe will contribute markedly to Shafer Bearing performance in the future. Such improvements will be available in Shafer Bearings and for Shafer Bearing applications as soon as possible; will be announced to the industries of America as rapidly as practical.

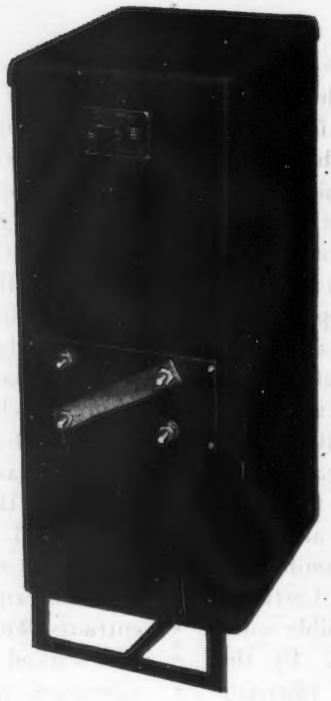
We want to extend our heartiest thanks to every entrant and especially to the successful entrants. We want to thank the panel of judges who worked long and unselfishly in their consideration, evaluation and judgment of the entries.

In conclusion, we recognize that a program looking toward increased industrial efficiency and economy cannot reside solely with one company, but must result from the cumulative and cooperative contributions by every industrial unit. That is how the Shafer Achievement Awards are to be interpreted . . . a cooperative contribution by this company to the common good and the common goal.

SHAFER BEARING CORPORATION

1422 West Washington Boulevard • Chicago 7, Illinois

SHAFER
CONCAVEX
SELF-ALIGNING BEARINGS



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The outstanding performance of the Udylite-Mallory Rectoplater needs no introduction to all those who use this flexible, economical source of plating "Amps". There are over five million "Amps" already in constant operation.

The NEW Rectoplater combines all the advantages of the original Rectoplater (standardized design, flexibility of use, low cost, etc.), plus many new features which make it absolutely the finest source of current for all types of plating to be found anywhere.

UDYLITE engineers have developed a better, more efficient system of "directed cooling"—a more rigid, vertical fan mount—greatly increased rectifier junction area—stepped up amperage output. They have installed an easy, positive lubrication system—top exhaust ventilation with new type baffling which saves valuable floor space—improved and strengthened construction. All without additional cost.

The NEW Rectoplater has greater efficiency, longer life, better performance, and still greater dependability. It's just what you have been looking for.

THE UDYLITE CORPORATION

1651 EAST GRAND BOULEVARD • DETROIT 11, MICHIGAN
REPRESENTATIVES IN ALL PRINCIPAL CITIES

the front end of the tube, built-u from die castings and housing ni rows of air-intake valves made fro flat spring-steel. Nine main petr jets, each with a nozzle of about 1/1 in. in diameter, project from the re face of the grille into three ventur formed by horizontal louvres. In th grille there are, in all, 126 doubl rectangular leaves of thin pen-m steel, comprising 256 leaves in all.

Fuel is supplied to the atomizers o jets through a filter and pipeline passing up the forward tubular sup porting strut. Three compressed-ai jets, connected to an external suppl for starting the engine, are locate above the top row of three jets an a sparking plug is mounted in th tubular casing about 2 ft. 6 in. behin the grille and used also for startin purposes only. There is no turbin or compressor and the engine is a pure jet or reaction-type unit.

In operation air is drawn in throug the grille by differential pressure be tween the two sides, or forced in by the compressed air nozzles for start ing. Fuel is sprayed in through th nine jets and the mixture of air an fuel is ignited, by the sparking plug in starting, and by residual flame left in the combustion chamber after each explosion when the engine is running. The high pressure generated by the explosion closes the grille valves and the gases are forced to escape down the pipe to the rear.

Railroad Car Door Output Rises At Youngstown Plant

Youngstown

• • • **Substantial orders for railroad car doors have been awarded to the Youngstown Steel Door Co. during the last few weeks for delivery some time this year, according to company officials.**

About half of the Youngstown Steel Door Co.'s plant is working on car doors which have been given a high priority, and indications are that this will continue, according to company officials. For a time, the car door department was virtually idle because no steel was available for this work.

The plant is also working on large Navy orders for droppable fuel tanks for aircraft. While the Army has cancelled some of its fuel tank orders, there have been no curtailments in Navy contracts because of the long distances naval planes must fly.

for a

"BASIC" FOUNDATION

This hexagonal blast furnace base, fabricated by PSF from accurately cast and machined sections, is not only a good example of quality work—it also illustrates the basically vital role that castings play in heavy machinery and equipment generally. They *must* be dependable—uniform in texture, sound and strong—correct to the "specs" in every detail. That's the way PSF's highly modern methods and facilities are set up to produce them for you—on special or production jobs—in carbon or alloy steels.

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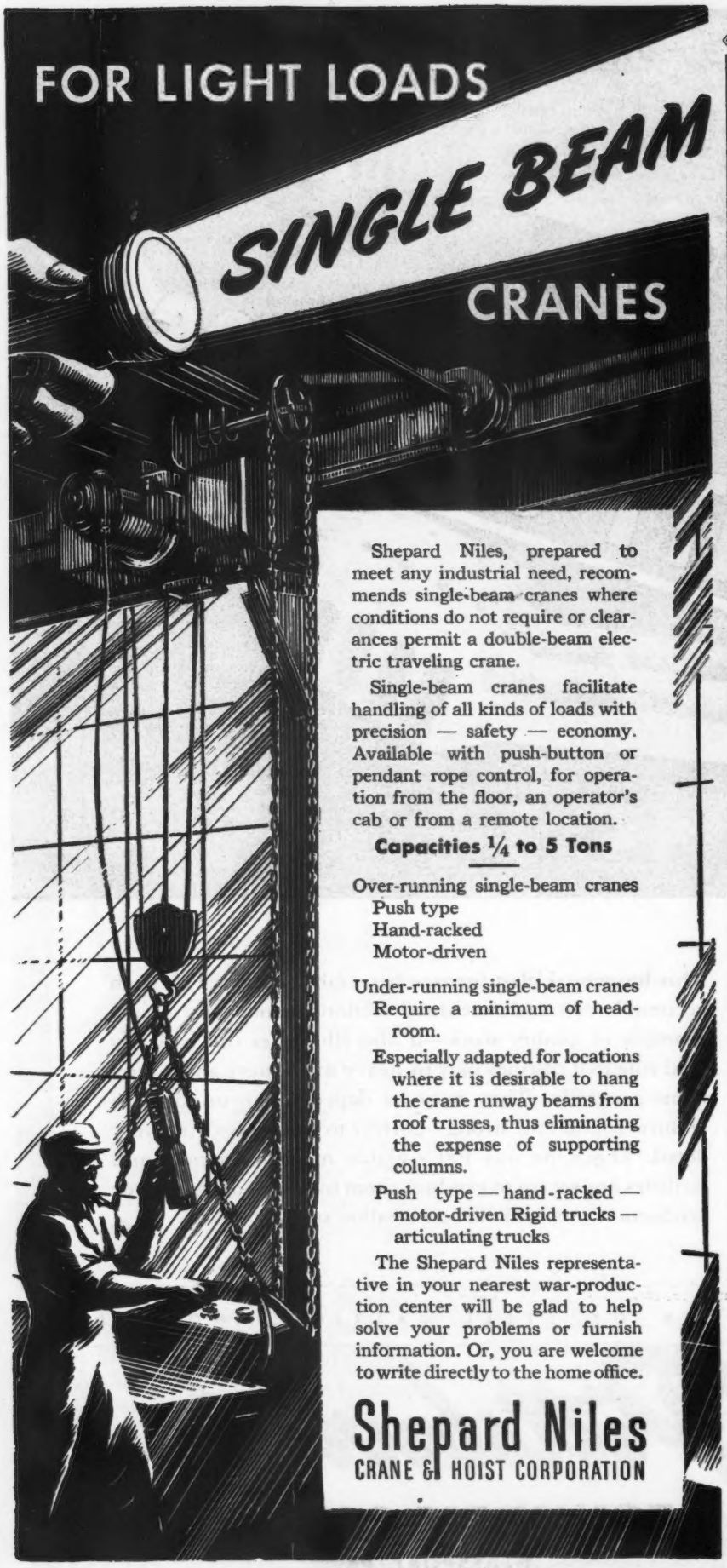
46 YEARS OF STEEL CASTING KNOWLEDGE

Pittsburgh

STEEL FOUNDRY CORPORATION

GLASSPORT, PA.

Sales Offices: NEW YORK • PHILADELPHIA • WASHINGTON AND CHICAGO



Shepard Niles, prepared to meet any industrial need, recommends single-beam cranes where conditions do not require or clearances permit a double-beam electric traveling crane.

Single-beam cranes facilitate handling of all kinds of loads with precision — safety — economy. Available with push-button or pendant rope control, for operation from the floor, an operator's cab or from a remote location.

Capacities ¼ to 5 Tons

Over-running single-beam cranes
Push type
Hand-racked
Motor-driven

Under-running single-beam cranes
Require a minimum of headroom.

Especially adapted for locations where it is desirable to hang the crane runway beams from roof trusses, thus eliminating the expense of supporting columns.

Push type — hand-racked — motor-driven Rigid trucks — articulating trucks

The Shepard Niles representative in your nearest war-production center will be glad to help solve your problems or furnish information. Or, you are welcome to write directly to the home office.

Shepard Niles
CRANE & HOIST CORPORATION

356 SCHUYLER AVE. • MONTOUR FALLS, N. Y.

Production Rates In Australia Suffering Because of Shortages

New York

• • • Recent statements from Melbourne indicate that Australia's iron and steel industry, though performing well under wartime circumstances, is seriously hampered by a labor shortage of extreme proportions, and is being threatened by a fuel supply that is already tight, while promising to get worse.

According to Mr. H. G. Darling, chairman of the Broken Hill Proprietary Co., Ltd., the plant at Newcastle has performed well, although to assist in the solution of the serious shipping problem it has been necessary to continue the use of low grade New South Wales ores. A new open hearth has been put into operation, but accumulated repairs on other furnaces now being completed have prevented the output from rising.

The plant as a whole has been reflecting the effects of five years of hard wartime usage in addition to suffering from a lack of coal. A new plant has been erected for the sintering of flue dust from blast furnaces, but in common with other construction projects, it was delayed due to a lack of labor. The 18 in. skin pass mill which went into operation late in 1943 has assisted considerably in meeting the demand for cold-rolled mill products.

Operations at the ferroalloys plants have been expanded to such an extent that the stocks of these alloys are now assured. Stocks of magnesium are said to be sufficient to meet a reduced demand for months ahead, so active production of this metal has stopped.

Mr. Darling says that the Commonwealth Steel Co. continues to produce special steels in the form of bars, forgings and castings for munitions, although revisions in the size of the overall program have lowered the volume of its production. The new sheet mill has proved capable of meeting Australia's requirements for stainless sheets. Wire mill of Rylands Bros. Pty., Ltd., was said to be another of the plants adversely affected by the manpower shortage, although production has been fairly well maintained.

How to keep out of the "Surplus" Business

It has been estimated that $15 to $20 billions of surplus material will require disposal at the war's end. How will your postwar time and energy be spent—in production, or in the "surplus" business?

As far as steel is concerned, you can trim inventories right now—by buying as you go from a Frasse warehouse. Frasse stocks of cold finished bars, tubing, stainless, alloy and aircraft steels are ample. Tonnage has more than doubled to serve war needs. By using Frasse stocks, you maintain war production, but keep your inventory low—escape dead surplus when cancellations and cutbacks occur.

No need to pile up the "surplus problem" with Frasse stocks handy. Delivery—from a wide range of sizes, shapes and grades—is immediate. To keep up production... keep down the surplus risk... call Frasse.

FRASSE
Mechanical and Aircraft Steels

COLD FINISHED CARBON BARS, SHEETS AND STRIP • SAE, AISI AND NE ALLOY BARS
DRILL ROD • AIRCRAFT ALLOY BARS AND TUBING • STAINLESS STEEL SHEETS, STRIP,
PLATES, BARS, WIRE, PIPE AND TUBING • SEAMLESS CARBON AND ALLOY TUBING
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Five Brothers . .

. . . and an Idea

It isn't often that an idea created in the minds of boys will materialize in later life. With the five Turner brothers, William*, Cort, Frank, Charles and Robert, their boyhood idea that some day they would be in business together, overshadowed all the obstacles of hard work and study to make this idea a reality. Finally in April, 1939, they purchased their first grinding machine and formed their own company. From this modest beginning they gradually won recognition among manufacturers for precision-built gauges. This recognition made expansion necessary, and today their company occupies one of the most modern buildings for the manufacture of gauges in the country. The TG stamped on a gauge represents a product backed by the integrity of five brothers and their practical knowledge of precision gauges.

*William Turner, of the U. S. Navy, was killed in action in the Coral Sea Battle.

TURNER BROTHERS

The Stamp TG of Precision

TURNER GAUGE GRINDING COMPANY
2625 HILTON ROAD • • FERNDALE 20 MICHIGAN

Output of Civilian And Military Trucks Is Up 100,000 Units

Detroit

• • • The year 1944 was one of continued improvement in production in the plants supervised by the Automotive Division of the War Production Board, that agency reports in summarizing the accomplishments of the year.

Output of commercial and military trucks last year, it was pointed out, exceeded 1943 output by nearly 100,000, the most significant gain being in the heavy vehicle class. Manufacture of commercial buses more than tripled in 1944, and the output in 1945 is expected to double last year's total to meet increasing civilian needs. Production of permitted spare parts for civilian use reached an all-time record figure of $750,000,000 in 1944. Labor situation, according to this survey, showed some improvement in the foundries which have been and still are suffering from severe manpower shortages; and full benefits of the 1944 scheduling program for the production of such critical items as transmissions, axles, engines, and wheels, are just beginning to be felt.

The 1945 civilian and military truck production program has now been finalized to 869,212 units, increases against 1944 largely being in civilian trucks. Almost 10,000 commercial buses are scheduled for production in 1945, about double the preliminary 1944 total of 5,087.

Employment in plants owned or operated by the automotive industry totals about 850,000 today, the WPB said, and these factories could utilize about 6,000 more workers today, in machine shops, production of end products and in assembly plants. Shortages of castings caused by inadequacy of foundry labor still continue but are expected to be gradually surmounted during 1945.

Fire Damages American Bridge Co. Assembly Plant

Gary, Ind.

• • • Fire in the road scraper assembly line and machine shop of American Bridge Co. plant here last week caused damage estimated at $250,000. Production in the machine shop has returned to normal but approximately three weeks will be required to restore the road scraper assembly line, it is estimated.

Improve SIZING OPERATIONS *with* KENNAMETAL *Balls*

Advantages of KENNAMETAL Balls

- Hold size within tolerance for thousands of operations.
- Improve concentricity, and maintain gage of hole.
- Produce work-hardened, mirror-smooth finish.
- Reduce rejects to a minimum.

Kennametal's modulus of elasticity, 2 to 3 times that of steel, enables it to effectively resist deformation. This property, in combination with amazing wear-resistance due to exceptional hardness, ideally suits Kennametal balls for economical, accurate burnishing operations. For example—Kennametal balls, used to burnish holes to size in hardened steel bushings 3/4" long, held tolerance and concentricity for 60,000 operations. Steel balls, on the same operation, produced only 600 sizings. On this job, the use of Kennametal balls practically eliminated defective work, and saved approximately 90% of the time previously required to check gage of holes sized with steel balls.

Kennametal balls can be supplied from stock in ten standard sizes, ranging from 1/8" to 1" diameter. Special sizes can be provided. Catalog 44 contains particulars and prices. A copy is yours for the asking.

KENNAMETAL
SUPERIOR CEMENTED CARBIDES
KENNAMETAL *Inc.*, LATROBE, PA.

ARE YOUR EMPLOYEES SKATING IN OIL?

End the danger quickly with *SPEEDI-DRI*

A BLEEDING, oil-soaked floor makes a great skating-rink, but it's dangerous to life and limb, it slows production, and it's a serious fire-hazard. SPEEDI-DRI is your best answer. This light-reflecting, granular, oil- and grease-absorbent acts as a poultice for sick, slick floors, soaking up fresh oil rapidly and even drawing out old deposits until your floors are like new. The minute it's spread, it provides a non-skid footing that prevents many a slipping accident. What's more, it's fire-retardant! Easily spread and cleaned-up without interrupting production, it saves hours of porter-labor. SPEEDI-DRI has *many* other uses, too. Write for literature and FREE SAMPLE.

SUPPLIERS: East — Refiners Lubricating Co., New York 1, New York.
Midwest & South — Waverly Petroleum Products Co., Philadelphia 6, Pa.
West Coast — Waverly Petroleum Products Co., Russ Bldg., San Francisco 4, Calif.

SPEEDI-DRI
OIL AND GREASE ABSORBENT

New Railroad Radio Communications Get Thorough Testing

Baltimore

• • • Seven railroads have completed 30,000 miles of test runs employing new very high frequency radio communications in train control, it was disclosed recently.

The new railroad radio communications equipment, which makes possible direct train control communications between the caboose and engine, stems directly from engineering and production experience gained by the company in developing and manufacturing very high frequency radio systems used by allied air forces in dispatching and controlling mass maneuvers of military air fleets on world fighting fronts, according to Bendix officials.

Bendix Radio, it was explained, has been receiving an increasing number of inquiries and requests for operating tests of very high frequency radio communications equipment since actual tests were first conducted last March with the Chicago, Burlington & Quincy, and the Baltimore & Ohio railroads.

The satisfactory completion of early tests and widespread interest displayed by a number of other railroads resulted in the recent establishment of a new engineering, sales and service organization.

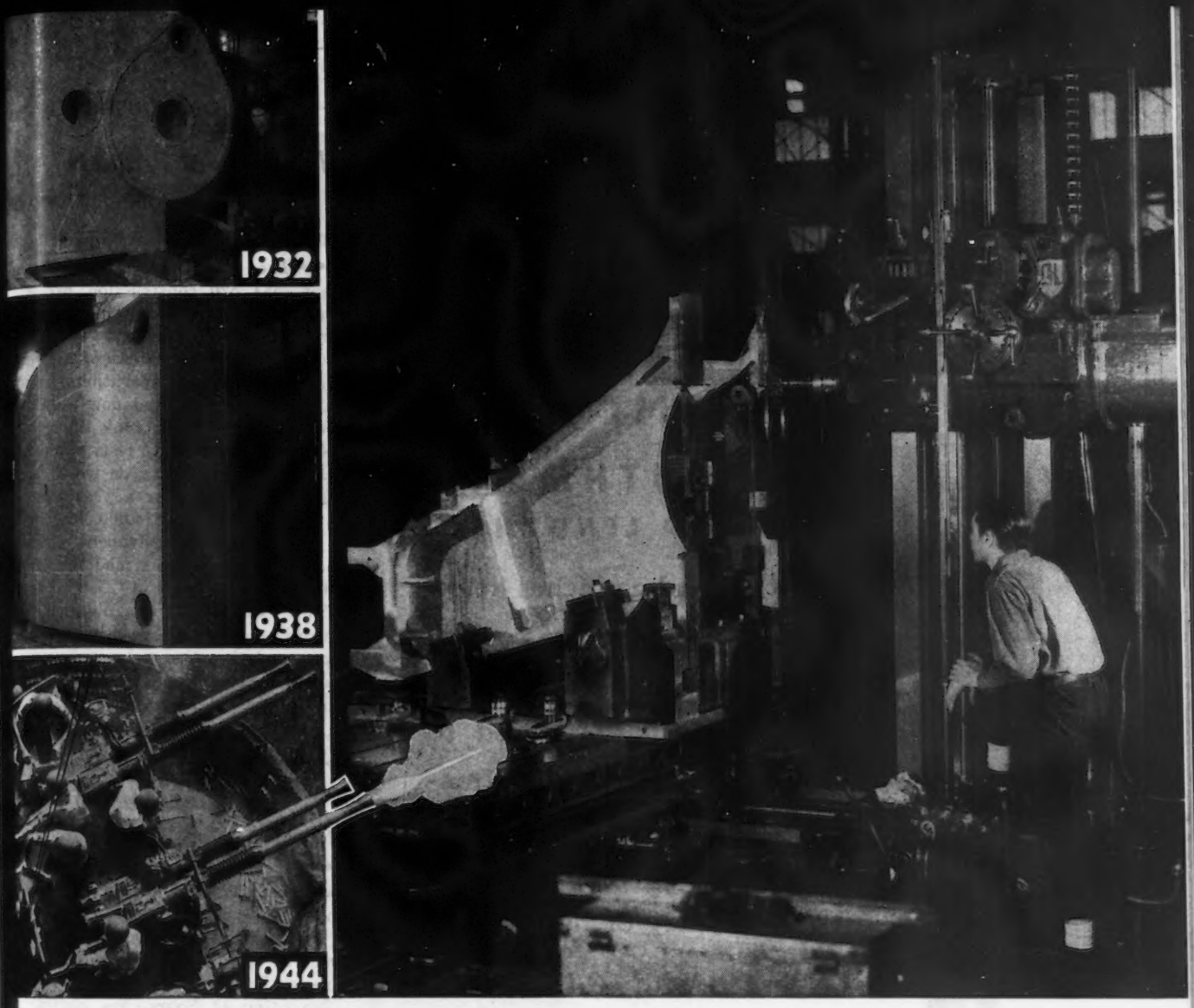
The 30,000 miles of test runs have already been completed by the Atcheson, Topeka & Santa Fe, Southern Pacific, Denver, Rio Grande & Western, Seaboard Airline Railway, the Missouri Pacific, Baltimore & Ohio, and the Chicago, Burlington & Quincy. Tests are scheduled soon for the Pere Marquette, Chicago, Milwaukee, St. Paul & Pacific, and Chicago & Northwestern roads, it was stated.

GRI to Get Glider Contract

Grand Rapids, Mich.

• • • Furniture company members of Grand Rapids Industries, Inc., anticipate new contracts for glider components as the result of recent awards of prime contracts for the powerless aircrafts.

Members of G.R.I. completed a 26-month production program last August, turning out sub-assemblies for CG4 army gliders for a variety of prime contractors. Tooling is just about intact and the only problem in resuming the program would be recruitment of about 1500 workers.



AN ADDED SERVICE TO THE RETOOLING OF AMERICA

When the day comes this company will have: Welding facilities for production of structures of any shape and any size within transportation limits. Machine tool facilities to machine them. Engineering service skilled in machine design to assist you.

We will be glad to get in touch with you at any time.

DANLY MACHINE SPECIALTIES, INC.
2100 SO. 52nd AVE. CHICAGO 50, ILLINOIS

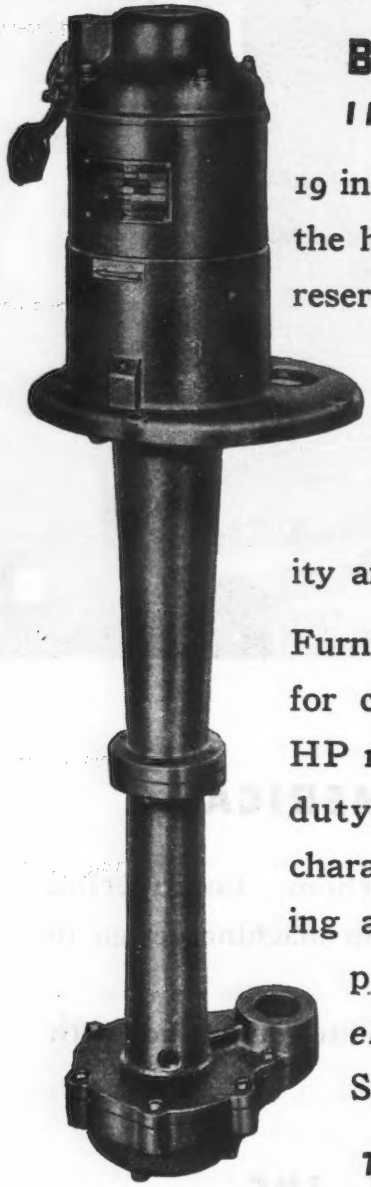
DANLYWELD

Danly Die Sets • Die Makers' Supplies • Welded Steel Fabrication

a new DEEP-IMMERSION GUSHER COOLANT PUMP

BY RUTHMAN

IN TWO LENGTHS



19 inches and 23 inches below the high level line of coolant reservoir. Model HL-15025-B has been produced to meet the need of machine tool requirements for greater tank capacity and utility of floor space.

Furnished with 1/4 HP motor for continuous duty and 1/2 HP motor for extra heavy duty, in standard current characteristics. Entire rotating assembly on heavy one-piece ground shaft is *electronically* balanced. Simple installation.

Types and models available for every requirement

Model HL-15025-B

WRITE FOR CATALOGUE

THE RUTHMAN MACHINERY CO.
1821 READING ROAD CINCINNATI 2, OHIO
THE "GUSHER" — A MODERN PUMP FOR MODERN MACHINE TOOLS

Plan Postwar Projects For Michigan Highways

Lansing, Mich.

• • • **The Michigan State Highway Dept. has 520 construction projects earmarked for activity in the first three years after the war, including 1600 miles of reconstruction, 200 new bridges and grade separations, many miles of widening, and new sign installations for state trunk lines.**

Complete plans have been made for $11,000,000 in projects, on which bids can be advertised for a year's work in 90 days. Another $14,000,000 worth of projects are in advanced stages, and surveys have been made on $60,000,000 more.

Two expressways are planned for Detroit — one, the Detroit crosstown route, and the other a limited access way to the northeast. By-passes are planned around 12 major cities.

Preliminary Plans Let For Cleveland Bridge

Cleveland

• • • **A contract for plans and estimates for the $900,000 Spring Common bridge project has been awarded to Wilbur Watson & Associates, Cleveland, according to State Highway Director Hal G. Sours.**

According to Sours, the contract, for $35,000, is to include all surveying, preliminary plans, detailed plans, and final estimates on which building contractors will base their bids. The Cleveland firm has been given 120 days, plus time needed in a review of the plan by the State Highway Department and Bureau of Public Roads.

Construction of the bridge would necessitate removal of the Pennsylvania Railroad passenger station.

Inventory Limit Lifted

Washington

• • • **Eliminating stamped steel open hook type chain from the definition "sprocket chain" in L-193-a, WPB has announced that purchasers of this type of chain are no longer required to limit their inventories to a 45-day supply. Manufacturers of this kind of chain, WPB said, have been experiencing storage difficulties because production is on a 12-month basis while demand is of a seasonal nature. By eliminating the 45-day inventory limitation, purchasers are allowed to build up their supplies and alleviate the manufacturers' difficulties.**

OHIO FERRO-ALLOYS

FOR PRODUCTION OF CLEANER STEELS . . . *and elimination of Aluminum addition problems*

Simanal

• 20% SILICON • 20% MANGANESE • 20% ALUMINUM

SIMANAL ADVANTAGES

- Production of cleaner steels.
- Controls Alumina, Silica, and Alumina Silicate inclusions by introducing Manganese Oxide.
- Produces globular inclusion.
- Better distribution of inclusions.
- Grain size control.
- Uniformity from heat to heat.

Simanal will assist in cutting steel processing costs and reduce man hours by increasing yield and providing a better ingot surface.

Of all deoxidizers for molten steel Simanal is the most favorable in every respect when considering number, composition, size and arrangement of non-metallic inclusions remaining after deoxidization.

Your investigation of Simanal will bring the usual Ohio Ferro-Alloys helpful assistance in test applications.

FERRO SILICON 50%, 75%, 85%, 90%
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BOROSIL • SIMANAL
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SILICON • MANGANESE • CHROME

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Ohio Ferro-Alloys Corporation
Canton, Ohio

Chicago Detroit Pittsburgh San Francisco Tacoma

versatile,
flexible power

Strike straight at your
materials handling
cost by using

CLARK fork trucks

—fast, versatile, flexible power
ready 24 hours a day for any
job of moving materials.

Another PRODUCT of CLARK EQUIPMENT COMPANY

CLARK TRUCTRACTOR
BATTLE CREEK, MICHIGAN, U.S.A.

Products of CLARK • TRANSMISSIONS • ELECTRIC STEEL CASTINGS
AXLES FOR TRUCKS AND BUSES • AXLE HOUSINGS • BLIND RIVETS
INDUSTRIAL TRUCKS AND TRACTORS • HIGH-SPEED DRILLS AND REAMERS
METAL SPOKE WHEELS • GEARS AND FORGINGS • RAILWAY TRUCKS

United Engineering Buys Adamson Machine

Pittsburgh

• • • **United Engineering & Foundry Co.** has bought the Adamson Machine Co., Akron, a large producer of machinery and equipment for rubber and plastics industries, for $1,500,000.

The Akron concern will be reorganized under the name of the Adamson-United Co., and will be operated as a wholly-owned subsidiary of United Engineering & Foundry Co. K. C. Gardner, a former Youngstown man, is president of United Engineering, and F. C. Biggert is chairman of the board.

F. L. Dawes, former general manager of the Adamson Machine Co., will be the president of Adamson-United Co., with Andrew Hale, formerly associated with the Farrell-Birmingham Co., serving as vice-president. John L. Young, vice-president of United, will also be vice-president of the acquired company. George B. Lang, treasurer of United, will serve as secretary and treasurer of Adamson-United.

Services Urge Early Interim Financing

New York

• • • **Army and Navy** industrial services are so intent on speeding clearance of plants for new war production, upon completion of contracts, that they now are urging contractors to make commitments for termination loans for interim financing well in advance of the time when the contracts will be terminated. Their hope is that the contractor thus will be in position to use the key loan vehicle immediately upon the termination of the contract, with no time being lost because of financing complications.

Such a loan will enable the contractor to convert quickly into cash up to 90 per cent, approximately, of the sound value of assets frozen by the termination. The loan is guaranteed through the Federal Reserve Bank by the Army, Navy, or Maritime Commission.

At a clinic on war contract settlement problems held by the National Association of Manufacturers, Comdr. D. P. Wells, chief of the Navy Fiscal Division, told contractors that they now are able to get a firm commitment on such a loan at a fee limited by the director of contract settlements to one-quarter of one per cent.

For effective Fluid Power Systems

If you have mechanical operations to get done with efficiency and economy, consider Fluid Power.

It is the modern way to transmit power from its source to its job—without shafts, gears, belts or levers.

It moves wherever you want it to go through tubes, and is controlled by valves.

Your Fluid Power system will deliver sure and dependable performance, under all conditions, if it is

Engineered by **PARKER**

THE VITAL LINK

in Fluid Power is the Circuit. It goes around corners and into tight places. It must be proof against leak, shock and vibration, and must be pressure-tight.

Parker brings twenty years of experience to the engineering of this Vital Link. We build the valves and fittings, and the tools to handle them.

This specialized "know-how" is yours to command.

* * *

You'll find it worth-while to talk with a Parker Fluid Power Engineer. Write to The Parker Appliance Company, 17325 Euclid Avenue, Cleveland 12, Ohio.

PARKER

Aluminum STAMPED ON REGULAR DRAWING PRESSES

BY Parish

Multiple contour shapes are press-formed on Parish presses with a minimum number of draws. No creases or wrinkles to require peening. No impairment of metal structure. There is minimum metal waste because gripper room need not be allowed for. Production speed is multiplied with consequent lower costs. Whatever your parts problem, Parish pressed metal parts may help you get greater production of better, lower cost finished products. Parish is prepared to work with you from the initial design stage on through to the production and finishing of complete assemblies. Fully integrated, including departments for heat treating, X-ray inspection, welding, japanning or other finishing, Parish offers a unique service to American industry. Write today.

MODERN DESIGN AT LOW COST

Parish Pressed Steel Co.

Subsidiary of SPICER MFG. CORP., READING, PA.

Western Representative: F. Somers Peterson, 57 California St., San Francisco, Calif.

Mineral Production Disclosed for 1944 By Secretary Ickes

Washington

• • • Secretary of the Interior Harold L. Ickes announced recently that the United States and Alaska produced a record total of $8,543,000,000 in minerals in 1942 to shatter the previous high of $8,056,000,000 established in 1943.

Information provided by the Economics and Statistics Branch of the Bureau of Mines, shows that the 1944 mineral output represents a gain of 6 per cent over 1943. In 1942, another record year, output was $7,575,700,000.

Of the estimated total of $8,543,000,000 in mineral output mineral fuels contributed $5,254,000,000, compared with $4,589,000,000 in 1943, an increase of more than 14 per cent; metallic products reached $2,377,000,000, compared with $2,493,000,000 in 1943, a drop of nearly 5 per cent; and other nonmetallic minerals, $912,000,000, compared with $974,000,000 in 1943, a decline of about 6 per cent. Major factors contributing to the decline in metallic products and nonmetallics, other than fuels, were the reduced demand for certain metals, manpower shortages in many mineral-producing areas, and the continued slump in the building industry.

Declines rather than gains were commonly recorded in the metals group, significant ones including aluminum, bauxite, chromite, copper, ferro-alloys, gold, iron ore, lead, mercury, molybdenum, silver, tantalite-columbite, tungsten, vanadium, and zinc. Gains were registered for beryllium, cadmium, manganese ore, pig iron, nickel, and platinum.

All the fuels—anthracite, bituminous coal, coke, natural gas, natural gasoline and liquefied petroleum gases, and petroleum—registered gains.

Of the other nonmetallic minerals, asbestos, native asphalt, barite, boron minerals, emery, feldspar, fluorspar, lithium minerals, mica, mineral pigments, phosphate, potash, pyrites, salt, sodium salts, sulfur, and tale showed moderate to large increases. Decreases were shown by most abrasives, cement, clay products, graphite, kyanite, peat, sand and gravel, slate and stone.

The year-end report on domestic mineral production, submitted by the Bureau of Mines, follows:

Light Metals—Drastic curtailment

McKAY

McKAY

BACKED-UP ROLLER LEVELER

THE McKAY Backed-Up Roller Leveling Machine has extraordinary rigidity because its small diameter work rolls are supported by backing-up rolls. This type of leveling works the sheet more thoroughly.

Sheets processed on this type of leveler are strain relieved to a greater extent and have far superior stamping and drawing qualities than those processed by the ordinary leveler.

Compact design reduces required floor space.

One shot lubrication system is optional.

PERFORMANCE RUGGEDNESS
PRECISION AND SAFETY

ASSOCIATE COMPANY
The WEAN ENGINEERING CO., Inc. WARREN, OHIO

The McKAY MACHINE Company
ENGINEERS AND MANUFACTURERS OF SHEET, TIN, AND STRIP MILL EQUIPMENT
YOUNGSTOWN, OHIO

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SHAPED WIRE • When you can "do it with wire" you cut production cost. Perhaps **PAGE** can show you how. Certainly **PAGE** can produce wire shaped to your specifications, drawn from Stainless Steels, Carbon Steels or Armco Ingot Iron, up to .250" square and widths to ⅜ inch.

WELDING WIRE • **PAGE** local distributors offer welding electrodes of Carbon Steels and a complete range of Stainless Steels for every type of welding.

GENERAL WIRE • Spring wire, rope wire, aircraft wire, telephone wire—think of *any* kind of wire and **PAGE** either makes it or can make it for you.

If your product or production involves the use of wire, it will pay you to

. . . get in touch with Page!

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of light metal production was necessitated in 1944 because of the changing pattern of munitions production and excessive original estimates of needs. Output of primary and secondary aluminum, plus Canadian imports, far outstripped requirements in 1944 so that over-all cutbacks aggregating about 54 per cent of total capacity were made during the year. As a result, output of primary aluminum fell from 920,179 short tons in 1943 to 777,700 tons, valued at $233,300,000, in 1944. Production and consumption of bauxite declined markedly in 1944, and late in the year production reached the lowest monthly rate in nearly two years. Shipments dropped from 7,496,250 short tons in 1943 to 3,344,800 tons, valued at $16,680,000, a decline of about 55 per cent. In line with reduced output of aluminum and bauxite, the production of alumina (from which the metal is made) also was greatly curtailed during the year, and over-all cutbacks totaled about 58 per cent of original installed capacity.

Decreased demand for magnesium and a growing stockpile of the metal forced production downward precipitously in the second half of 1944. By the end of the year output was reduced to about 15 per cent of the original rated capacity. An extremely large part of the cut-back occurred in government-owned plants, all but four of which ceased production. Output for the year was 170,000 short tons, valued at $69,700,000—virtually the same as for 1943.

Ferro-alloying Minerals — Molybdenum shipments from domestic ores were about 70 per cent of the 1943 total, due to lower production of alloy steels and a lessened demand for molybdenum as a substitute metal. Vanadium output dropped about 40 per cent, following the cancellation of contracts for government purchases. Chromite shipments slumped to less than 30 per cent of the 1943 total because of the improvement in the alloy situation and increased availability of chromite from foreign sources, and production of tungsten concentrates was down almost 8 per cent. On the other hand, the production and consumption of titanium reached new highs, and the output of manganese ore containing 35 per cent or more manganese was the largest since 1918, and 1944 was the second most productive year on record.

Copper, Lead, and Zinc—Production of copper declined 9 per cent in 1944 and lead 4 per cent, despite the continued need for large supplies of copper and the "tight" situation of lead

CONE AUTOMATIC MACHINE COMPANY

It is reported that . . . . . .

So tough is one new kind of glass that a searchlight lens made of it resists the heat of an 800 million candlepower lamp even though snow falls on the outside. *"Tuf-flex", Libby-Owens-Ford.*

get ready with CONE for tomorrow

Thermite (as used in incendiary bombs) has been applied to the demolition of metal structures. *McGraw-Hill Overseas Digest.*

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A new magnetic floor sweeper for factories looks like a lawn mower and picks up nails, scrap, small parts, and tools. *Stearns Magnetic Mfg. Co., Milwaukee.*

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One of our aircraft manufacturers has complete plans for fitting a new fuselage, with luxurious interior, to the wings and engines of war-time bombers. *Consolidated Vultee Aircraft Corporation.*

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In a newly-designed twelve-story parking garage, a single attendant can put away or bring out any one of 110 automobiles by merely pushing a button. *Park-O-Mat Co., Los Angeles.*

get ready with CONE for tomorrow

Plans are well advanced for annual trade fairs, on the European plan, in several American cities. *Bureau of Foreign and Domestic Commerce, Washington, D. C.*

get ready with CONE for tomorrow

Two hundred police chiefs recently witnessed a demonstration of a tiny radio receiver about the size of a pack of playing cards. *Hytron Corporation, Salem, Mass.*

get ready with CONE for tomorrow

The "Axonograph" is a device that photographically produces an axonometric drawing directly from a blueprint. *Glenn L. Martin Co., Baltimore.*

One manufacturer of electric appliances is already displaying his post-war models in order to gauge public tastes and preferences. *Proctor Electric Co., Philadelphia.*

get ready with CONE for tomorrow

"Fly-it-yourself" service is being planned on a basis similar to that of the familiar rented automobile service. *R. S. Robie, Boston.*

get ready with CONE for tomorrow

A "slot-machine" mail box accepts payment, stamps a letter and holds it for collection. *"Mailomat", Pitney-Bowes, Stamford, Conn.*

get ready with CONE for tomorrow

A new molding plastic is non-organic and will stand heat to 420° centigrade. *Mycatex Corp., Clifton, N. J.*

A new chemical, when sprayed on the soil of gardens, is absorbed by the plant and kills many insects and fungi. By this means potato crops are said to have been increased as much as 40 bushels per acre. *Rohm and Haas Co.*

get ready with CONE for tomorrow

A prominent scientist states that he believes that a temperature of absolute zero (—273.1° C.) may soon be attained. *Prof. Peter Debye, Cornell Univ.*

get ready with CONE for tomorrow

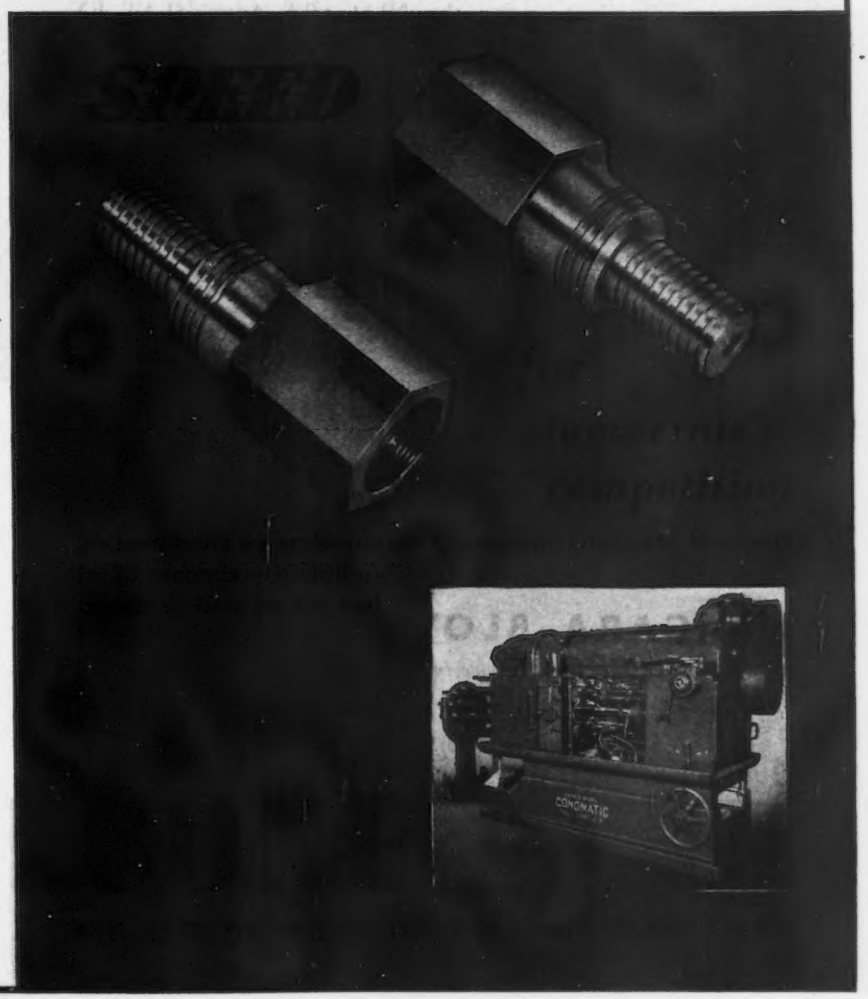
The new space-saving square milk bottles are already in use by one dairy. *Sanitary Farm Dairies, Cedar Rapids, Iowa.*

get ready with CONE for tomorrow

An electric motor has been built that develops 30 horsepower and weighs only 57 pounds. *General Electric Co.*

get ready with CONE for tomorrow

Paper forms for poured concrete are being used. *Sonoco Products Co., Hartsville, S. C.*



"BALANCED WET BULB" TEMPERATURE CONTROL

U. S. Patent Re-issue No. 22,533

Don't PURCHASE COOLING WATER!

● Whenever a process calls for the use of water to cool liquids or gases, investigate using the NIAGARA Aero HEAT EXCHANGER to gain these benefits:

1. Year 'round operation at full efficiency.
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3. Elimination of water treatment.
4. Saving 95% of water consumption.
5. Avoiding risk of shutdown in time of water shortage.
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The NIAGARA Aero HEAT EXCHANGER, using outdoor air as the cooling medium with the evaporative method, removes 1,000 B. T. U. from a liquid for each pound of water evaporated. Accurate temperature control within 2°F. is assured by the Niagara patented "Balanced Wet Bulb" control which always provides the correct admixture of fresh and recirculated air. Hundreds of industrial plants, operating a wide variety of processes, have found it the most reliable, most compact and economical apparatus for liquid cooling. Write for Bulletin 96.

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with respect to supply. The position of zinc was easier in 1944, and stocks gained throughout the year to reach a record high, even though output of the metal dropped 4 per cent from that in 1943. A shortage of labor was the main factor in the slump of all three metals. Smelter production of copper from domestic ores declined to about 990,000 tons valued at $234,000,000 (exclusive of premium payments to mines), compared with 1,092,938 tons valued at $257,934,000 in 1943. The output of refined lead from domestic ores in 1944 was estimated at 385,000 tons, valued at $49,280,000, and slab zinc at 568,000 tons, valued at $97,696,000. These values also are exclusive of premium payments.

Other Metals—Mercury production in 1944 dropped about 27 per cent in quantity and 56 per cent in value, following a sharp decrease in demand late in 1943 and the withdrawal of government purchasing. Antimony output at the mines was somewhat below the high point reached in 1943, since large reserve stocks and imports made increased production unnecessary. Output of arsenic, beryllium, and cadmium was up, but that of tantalite and columbite declined.

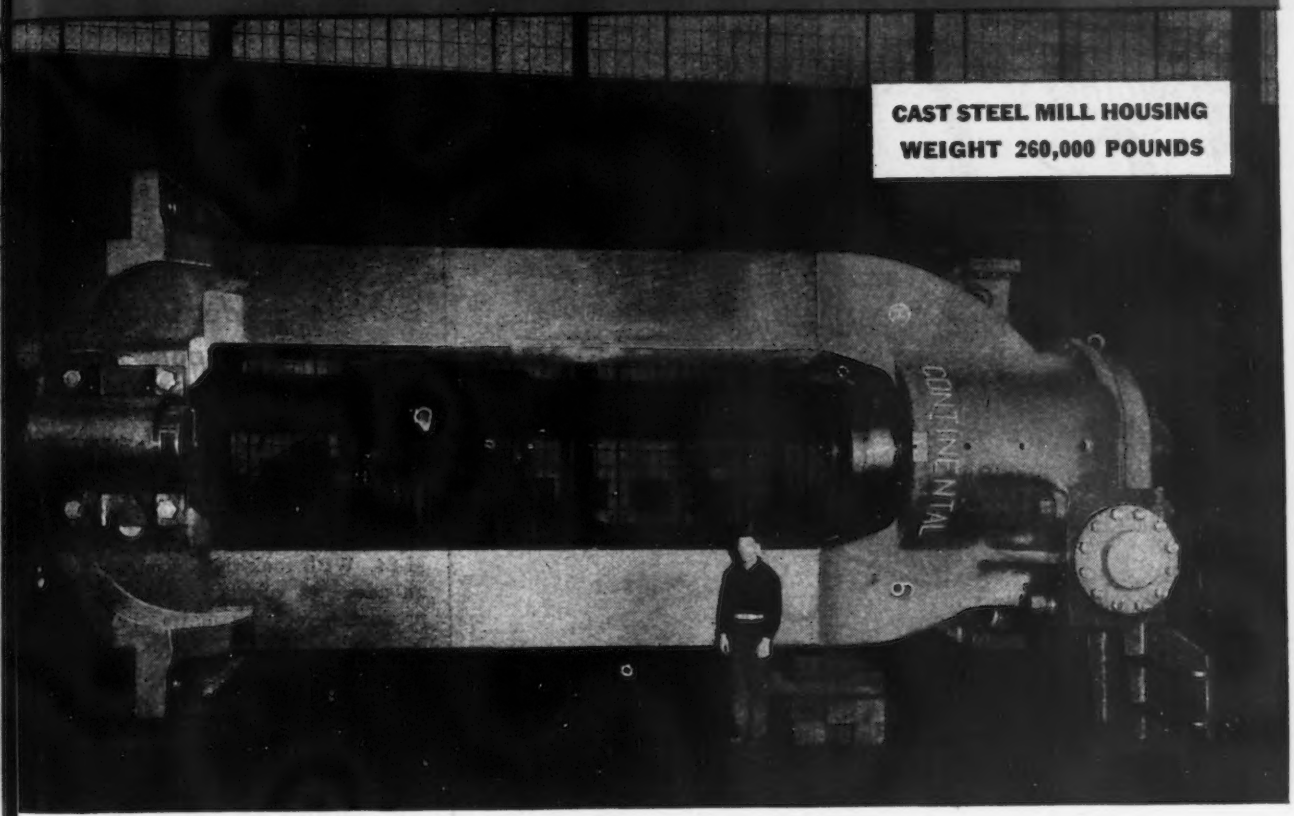
Bituminous Coal—The production of bituminous coal and lignite reached an all-time high in 1944 with an estimated output of 620,000,000 net tons, compared with the previous peak of 590,177,069 tons in 1943. This record performance was accomplished despite interruptions to output caused by labor shortages and difficulty in obtaining supplies and machinery.

Although production was the greatest on record it still was not sufficient to meet the demand created by the war program. By keeping a careful check on critical requirements and the diversion of and allocation of coal to important industries, the Solid Fuels Administration for War has endeavored to keep distress to a minimum.

Coke and Byproducts—The continued large requirements for metallurgical fuel by the iron and steel industry and the increased demands for solid fuels by other industrial consumers and the domestic coke trade resulted in the production of 73,700,000 net tons of byproduct and beehive coke, an increase of approximately 2,100,000 tons over the nation's previous record production in 1943. The gain was due entirely to an increase of 2,900,000 tons in byproduct coke output, as beehive coke production declined 800,000 tons. Completion of new oven capacities accounted for the increased byproduct coke output,

CONTINENTAL

CARBON AND ALLOY STEEL CASTINGS



Continental Products—

Carbon and alloy steel castings . . . Carbon steel, alloy steel rolls . . . Iron and alloy iron chill rolls . . . Rolling Mills and steel plant equipment . . . Special Machinery.

CONTINENTAL

FOUNDRY & MACHINE COMPANY

CHICAGO . PITTSBURGH

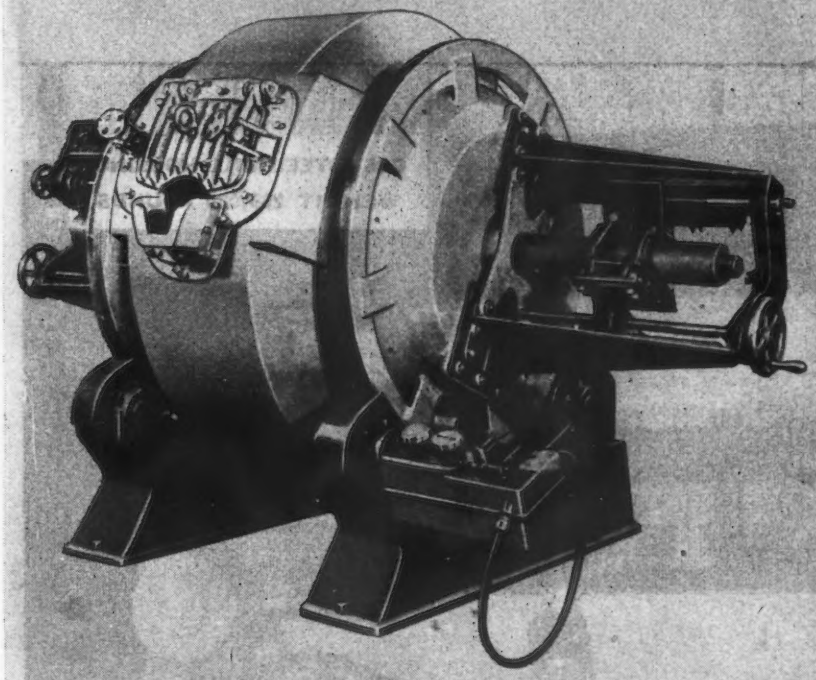
CHICAGO WORKS, ***East Chicago, Indiana***
PITTSBURGH WORKS, ***Coraopolis, Pennsylvania***
WHEELING WORKS, ***Wheeling, West Virginia***
WARWOOD WORKS, ***Wheeling, West Virginia***

Detroit Electric Furnaces

are doing an outstanding job in scores of foundries.

And for good reason . . .

Detroit Rocking Electric furnaces require less labor and produce more pounds of perfect castings per



man-hour. They produce as many as 8 ferrous or 16 non-ferrous heats in one eight-hour day. Because of their precise metallurgical and operating control, Detroit furnaces assure quality results and maximum economy.

Detroit Electric Furnaces are versatile, flexible and fast. Since melting takes place in a closed chamber, dirt and fumes are reduced to a minimum. Available in seven sizes with capacities from 10 to 8,000 lbs.

For further facts write to:

DETROIT ELECTRIC FURNACE DIVISION
KUHLMAN ELECTRIC COMPANY • BAY CITY, MICHIGAN

whereas the decline in beehive coke production was due principally to displacement of beehive-furnace coke by coke from the enlarged byproduct plants.

The estimated values of coke produced: Byproduct, $454,000,000; beehive, $47,000,000; total byproduct and beehive, $501,000,000. The combined value of the coke byproducts, including breeze, at the producing plants was $214,000,000.

Refractories — The demand for dead-burned magnesite, dead-burned dolomite, fire clay, silica brick, and alumina and chrome refractories was strong because of the high level of activity of metallurgical furnaces, but the curtailment of magnesium metal requirements led to a corresponding reduction in output of crude magnesite and magnesium chloride. Crude magnesite production in 1944 was approximately 523,000 tons, compared with 754,832 in 1943.

Certain Grades Denied Basic Open Hearths

Washington

• • • Basic open hearth consumers have been prohibited, except upon WPB approval, from purchasing 11 grades of carbon steel scrap by Direction 1 to General Preference Order M-24. WPB took this action to assure an adequate supply of scrap for the production of war materials in electric and acid open hearth steel furnaces and iron and steel foundries.

WPB Steel Division officials pointed out that inventories of these grades of scrap have declined consistently since Jan. 1, 1944, and that operations of the furnaces and foundries using such grades may be endangered if this trend continues.

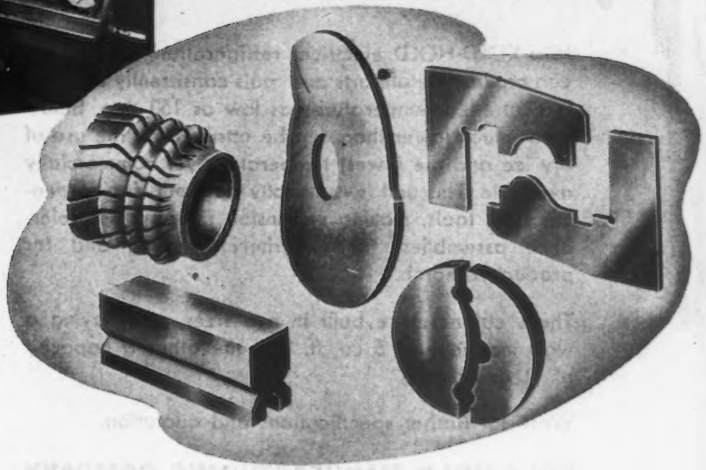
Basic open hearth furnace operators may apply to WPB requesting exceptions, the board said, and must furnish complete information to justify departure from the terms of the direction.

The grades which basic open hearth consumers can no longer buy, except upon WPB approval, are:

Billet, bloom and forge crops..	13
Bar crops and plate scrap....	14
Cast steel	15
Punchings and plate scrap....	16
Electric furnace bundles.....	17
Cut structural and plate scrap, 3 ft. and under.....	18
Cut structural and plate scrap, 2 ft. and under.....	19
Cut structural and plate scrap, 1 ft. and under.....	20
Two-foot foundry steel.....	22
One-foot foundry steel.....	23
Springs and crankshafts.....	24

This Versatile Grinder

WILL SAVE TIME ON MANY TOOL ROOM OPERATIONS



SAVE UP TO 75% ON

- Flat Form Tools
- Circular Form Tools
- Wheel Crusher Rolls
- Templates
- Profile Gages
- Cams
- Die Blocks
- Jig and Fixture Parts
- Ground Forms Of All Kinds

The Wickman Profile Grinder can be one of the most useful and easiest-to-use machines in any tool room. It will grind both positive and negative rake and clearance angles without attachments. Several thin pieces can be clamped together and ground at one time. Circular forms can be ground with the addition of a simple attachment for holding the work. Since the wheel need not be form dressed even for the most complicated contours and set-up is so simple, the Wickman Profile Grinder is very easy to change from one job to another.

The Wickman Profile Grinder will save you many hours and many dollars on every precision profile grinding job. Write today for full information on this useful machine and the work that it will do.

BUY MORE WAR BONDS

PIONEERS OF OPTICAL FORM GRINDING

THE Wickman CORPORATION

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150°
BELOW ZERO

In a KOLD-HOLD electrical refrigeration cabinet you can process metal parts and tools consistently at closely controlled temperatures as low as 150 deg. below zero—much lower than can be attained by the use of dry ice and the lowest temperature yet commercially available. This unit is especially designed for hardening steel tools, making expansion fits on close tolerance assemblies, for experimental work, and for product research.

These cabinets are built in two sizes, one having a work capacity of 5 cu. ft. and the other a capacity of 11 cu. ft.

Write for further specifications and quotation.

KOLD-HOLD MANUFACTURING COMPANY
438 NORTH GRAND AVE. • LANSING 4, MICH.

KOLD-HOLD

Austin Co. Using New Welded Truss Standard Length

Cleveland

• • • A new design for welded trusses of standard 50, 60 and 80-ft. lengths, in which for the first time H-sections with their webs in a vertical plane are used throughout without gusset plates has been adopted by the Austin Co.

According to J. K. Gannett, vice-president and director of engineering, the truss is readily adaptable to different loadings by simply changing the weights of the beams used for the various truss members. By keeping the depths of the individual members constant, these variations require no changes in shop details or fabricating jigs.

As the top chord is a wide flange beam, it can carry purlins at a variety of spacings without regard to panel points, and is also adaptable to continuous uniform loading. Similarly, the bottom chord can carry loads at any point and can be used, itself, as a monorail.

A "natural" for welding, shop fabrication on a 50-ft. truss requires a total of 41 lineal feet of fillet weld, all of which is accomplished by down welding. H-sections are assembled in a jig, tack-welded and welding is completed with the truss in a vertical position.

Fabricated completely from rolled members, which are cut to desired lengths, no splitting, blocking, slotting or chipping is necessary. The only raw cut edges are closed by the welds, so that only the smooth, hard, rolled surfaces are exposed, which gives the truss a maximum of corrosion resistance.

During full size load tests on two 50-ft. trusses of this new design made at the fabricating shops of the Austin Co. in Cleveland more than a year ago, failure occurred under a load which was 253 per cent of the design load, at which time an end vertical buckled. Despite the distortion of the truss when it collapsed, not a single welded connection failed.

Behavior of the truss under a heavy over-load was impressive and is attributed in large part to the fact that the lines of action of all members lie in one plane, as well as to the concentricity and symmetry of the end connections of the truss members.

Following the tests, trusses conforming to the spans in widest use

Where safe, sure footing is IMPORTANT—use JAL-TREAD

THE "SAFETY FIRST" CHECKER FLOOR PLATE

"Safety first" is the vital story of Jal-Tread . . . the new, improved rolled-steel floor plate. Jal-Tread's "checker" design grips each footstep with maximum friction surface at point of contact . . . insures maximum safety underfoot. This square design likewise makes Jal-Tread ideal for fabrication . . . easy to align, easy to fit in place during installation.

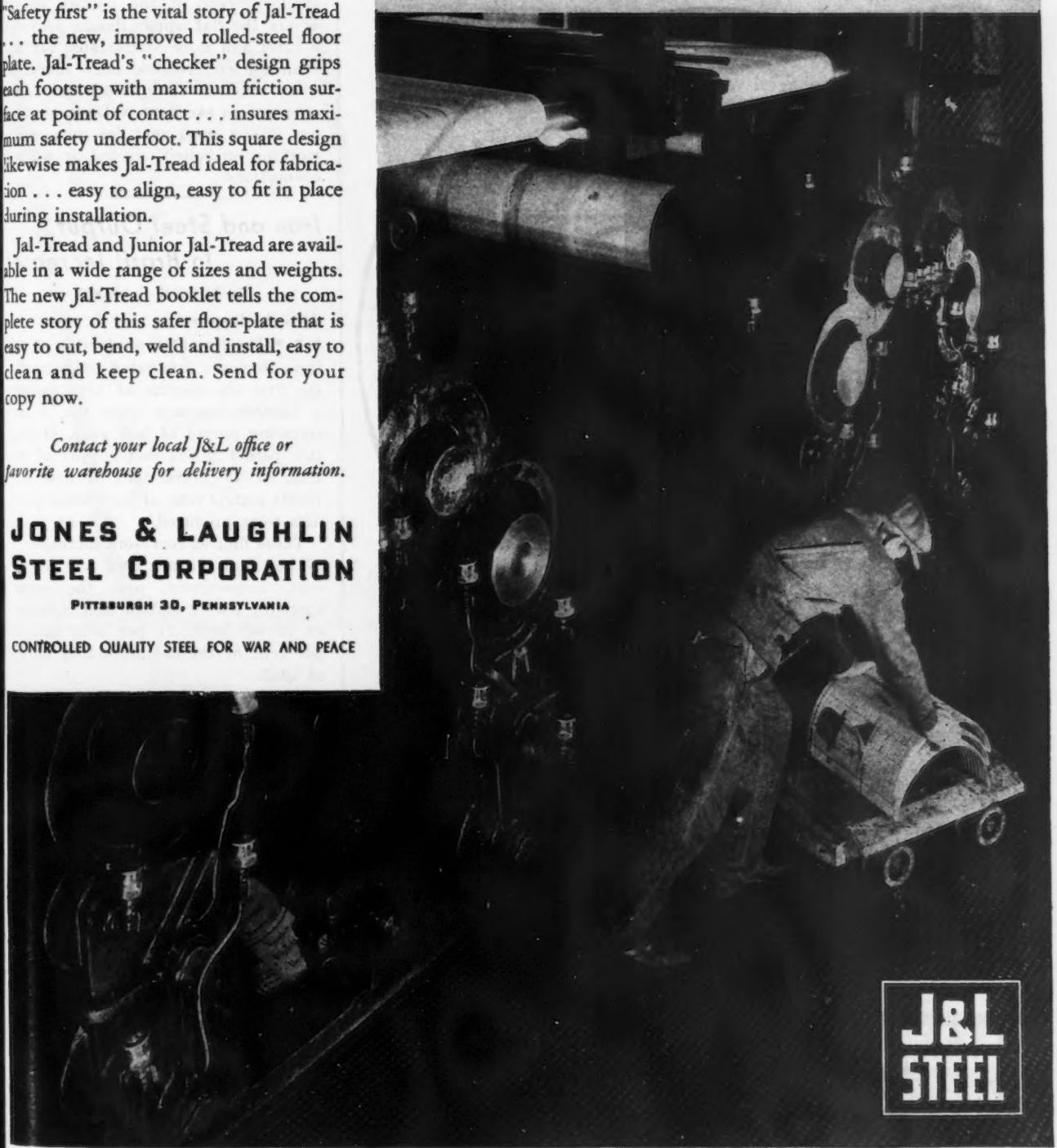
Jal-Tread and Junior Jal-Tread are available in a wide range of sizes and weights. The new Jal-Tread booklet tells the complete story of this safer floor-plate that is easy to cut, bend, weld and install, easy to clean and keep clean. Send for your copy now.

Contact your local J&L office or favorite warehouse for delivery information.

JONES & LAUGHLIN STEEL CORPORATION

PITTSBURGH 30, PENNSYLVANIA

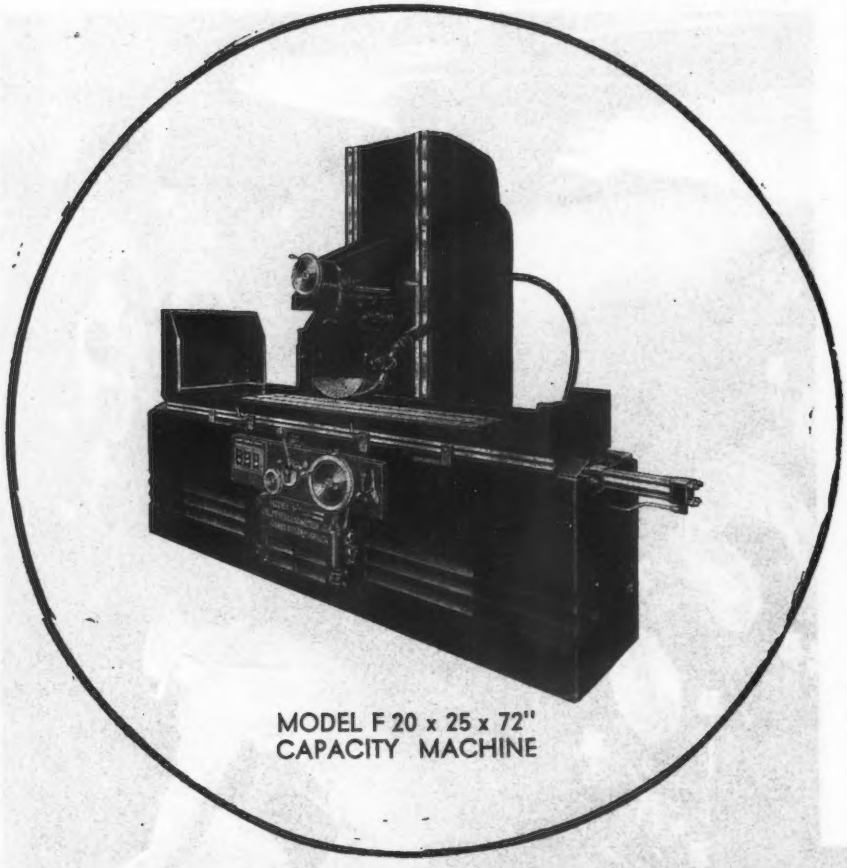
CONTROLLED QUALITY STEEL FOR WAR AND PEACE



GRAND RAPIDS

PRODUCTION TYPE HYDRAULIC FEED SURFACE GRINDERS

are meeting the most exacting needs of Army, Navy and Air Corps contractors requiring maximum production in surface grinding.



MODEL F 20 x 25 x 72" CAPACITY MACHINE

THE MACHINES ARE BUILT IN TWO TYPES:

MODEL "F" in sizes from 16 x 25 x 48" to 20 x 25 x 72", with maximum table speed of 150 F.P.M.

MODEL "A" in sizes from 12 x 18 x 36" to 14 x 18 x 72" with maximum table speed of 125 F.P.M.

Send for Bulletin 443

IF INTERESTED IN MODERN HIGH SPEED SURFACE GRINDING

GALLMEYER & LIVINGSTON CO.

200 STRAIGHT AVE., S.W.

GRAND RAPIDS 4 MICHIGAN

were designed and jigs set up for their manufacture. During the final quarter of 1944, trusses of this type were fabricated and shipped to plants in five widely separated localities, one of which involved an area of 100,000 sq. ft.

Experience in the field demonstrated that the new trusses are much stiffer than other welded trusses, and that they make steel erection work much safer. Structural iron workers, for instance, found that they could work much more easily on both top and bottom chords. This was particularly true of the bottom chord, where the flat upper flange provides a safer and more comfortable surface than the cut vertical edge found in most trusses. The flange not only provides an excellent walking surface but also a good seat for men while working on bolted, riveted or welded connections.

Iron and Steel Output In Brazil Increases

By EUGENE F. HORN

Rio de Janeiro

• • • **The Brazilian production** of pig iron, steel and laminated products for the first six months of 1944 showed a notable increase over the corresponding period of last year. During this period 29,643 metric tons of pig iron, 99,379 metric tons of steel and 78,894 metric tons of laminated products were produced.

These figures represent increases of 67 per cent, 81 per cent and 66 per cent, respectively, over the corresponding period of 1939 and increases of 12 per cent, 21 per cent and 13 per cent of the corresponding period of 1943.

At the present time there are 12 companies producing iron and steel, 11 of which manufacture laminated products as well. However, 89 per cent of the pig iron, 94 per cent of the steel and 88 per cent of the laminated products were produced by five companies.

It is reported that the first blast furnace of the new steel works of the Cia. Siderugica Nacional at Volta Redonda in the State of Rio de Janeiro will commence operations early in 1945.

According to Sr. Mauricio Grinberg, who is an engineer in the Instituto de Pesquizas Technologicas of Sáo Paulo, the annual consumption of steel products in Brazil is 8 kilos as compared to 800 kilos per capita in the United States.

Sulphite-Treated
Alloy and Special Steels

BENEFITS TO USERS

- ✓ 25% Greater Machining Speed
- ✓ 200% Longer Tool Life
- ✓ Fewer Rejections
- ✓ More Uniform Physical Properties
- ✓ Fewer Operations
- ✓ Better Finished Product

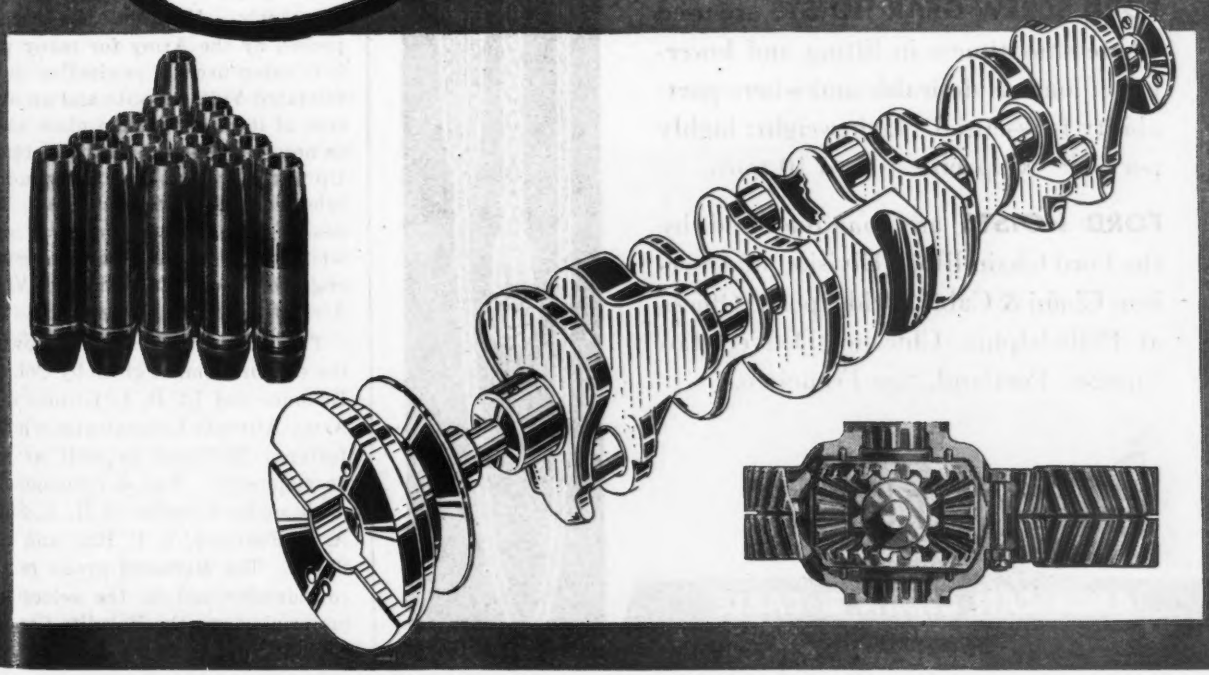
SULPHITE-TREATED alloy and special steels, which we have produced for a number of years, have solved many problems for steel users. They have been most satisfactorily applied where machinability is of first importance.

Sulphite treatment can be applied to most types of steel. It has been used successfully in the production of shells, crankshafts, camshafts, axles, and gears.

If you believe that your company may have an application for sulphite-treated steels, our sales and metallurgical staffs are at your service. We have accomplished satisfactory results for others and are ready to serve you in the same way.

WISCONSIN STEEL COMPANY

Affiliate of International Harvester Company
General Offices: 180 North Michigan Avenue, Chicago 1, Illinois



FORD TRIBLOC'S HOOK

is its

SAFETY VALVE

Ford Tribloc hooks are drop forged from special steel. This permits them to slowly open (without fracture) when overloaded. Indeed so ductile are the hooks that they will open before any other part of the hoist is damaged—thus not only preventing costly accidents but protecting the hoist itself.

FORD TRIBLOCS are ideal for constant hard usage. Spur gear construction, ball-bearing load wheels, both high tensile strength and elasticity in load chain, and many other features assure enduring efficiency. Capacities: ¼ to 40 tons.

FORD SCREW GEAR HOISTS are used where smoothness in lifting and lowering of loads is desirable and where portability is essential. Lightweight: highly portable. Capacities: ½ to 10 tons.

FORD HOISTS are manufactured by the Ford Chain Block Division of American Chain & Cable, Bridgeport. Offices at Philadelphia, Chicago, Denver, Los Angeles, Portland, San Francisco.

Order from Your Distributor

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BRIDGEPORT

FEATURE CONTINUATIONS

Metlbond Adhesive For Metals

(CONCLUDED FROM PAGE 64)

mal expansion of aluminum and Plexiglas. Likewise, experiment has shown that it is possible to bond steel, up to ¼ in. thickness, to aluminum even though the thermal expansion coefficients of these metals differ appreciably. In this case, the Metlbond also serves as an insulator to prevent electrolytic corrosion between the different metals. The magnesium development program is closely linked to the Metlbond development also because of the corrosive action between magnesium and aluminum.

Plastic dies, jigs and fixtures are susceptible to breakage in handling in the factory. This tendency can be greatly reduced by Metlbonding steel sheets to the plastic surfaces. Such plastic dies, jigs and fixtures are being used extensively at Consolidated Vultee Aircraft Corp., San Diego.

A great deal could be said regarding the necessary equipment and jigs required in conjunction with the application of Metlbond. Time does not permit other than to say that no one method is used to the exclusion of others; ovens, heated presses, vacuum bags, pressure bags and molds will be used depending on the particular application.

The development of Metlbond is not static; new types and combinations of existing Metlbonds are being tried constantly. Metlbond has been approved by the Army for many parts; it is being used in production in Consolidated Vultee plants and an expansion of its use will take place as soon as necessary facilities can be obtained. Up to the present time it has not been released to outside concerns. Those desiring to use the material should write to the office of the director of engineering of Consolidated Vultee Aircraft Corp.

The writer wishes to acknowledge the encouragement given by Col. P. H. Kemmer and Lt. D. L. Grimes of the Army Aircraft Laboratories who have fostered Metlbond as well as other developments. The development was made under direction of H. A. Sutton, A. P. Fontaine, T. P. Hall and Bruce Smith. The Metlbond group received considerable aid in the selection of materials from the Bakelite Corp. and E. I. duPont de Nemours Co.

FEATURE CONTINUATION

Tipped High Speed Steels

(CONTINUED FROM PAGE 61)

speed steel electrodes or stainless steel. None reported using atomic hydrogen for this purpose, although it is known that this technique is applied for repairing tools. Broken teeth are built up with high speed steel electrodes.

Worn multi-tooth cutters are salvaged by regrinding, 87 firms reported. Of these, 85 send such cutters out for salvaging, but 44 did a certain amount of regashing in their own toolrooms. Undersize reamers are reforged and reground by 35 of those shops reporting, and several indicated that worn reamers were simply reground to a smaller size. Some reamers are annealed, milled and tipped with one of the cast non-ferrous materials or with carbide.

Extending Tool Life

About 60 per cent of those replying to the questionnaire reported that subzero treatment, liquid nitriding or chromium plating had been applied to production tools or at least experimentally for the purpose of extending tool life. Out of 141 companies reporting, 35 have tried subzero treatment; 58, liquid nitriding; 65, chromium plating; 66 finer surface finish; and 77 companies indicated they sought closer control of tool angles (see Fig. 2). These methods are applied not only to single point tools, but also to milling cutters, reamers, taps, drills and thread mills. Although general comments listed increases in tool life from zero to 300 per cent, success was spotty, particularly in the case of subzero treatment, used to increase the tool hardness by obtaining a more complete transformation of austenite into martensite. On the other hand, no one disputed the fact that finer surface finish benefits tool life and product finish, and that closer control of cutting angles is desirable. The comments on these processes are summarized below:

SUBZERO TREATMENT: (*25 per cent report trying*)

Good and average results.

Some success, but not enough experience. About 25 per cent increase in tool life obtained.

Tool life improved anywhere from 15 to 35 per cent. Experimentally, 20 to 30 per cent increase in tool life extended. Good, 50 per cent increase in tool life. Very good on reamers, 100 per cent increase in tool life.

Usefulness strongly indicated.

The special Nusite heat treatment plus freezing improves 18-4-1 cutters.

Negative: No success. Not very good on gear shaper cutters. No good on Moly

WHY IMPACT MACHINERY REQUIRES KORFUND VIBRATION CONTROL

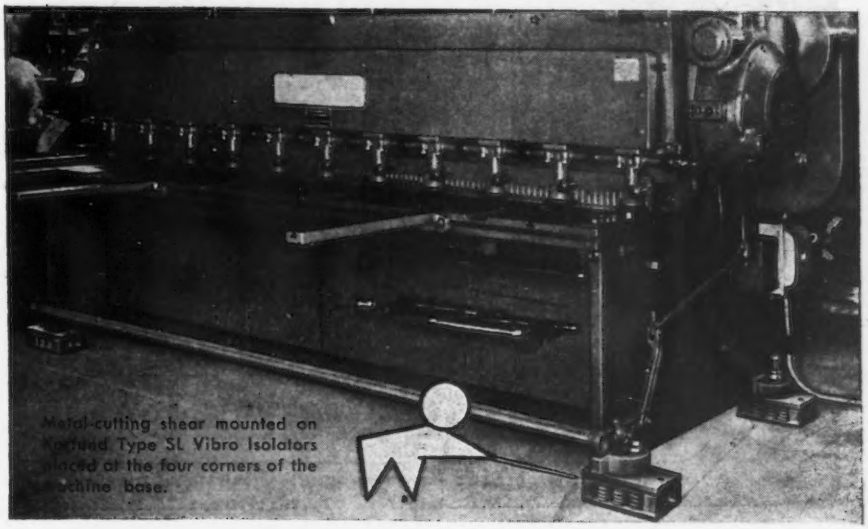
Resiliently mounting impact machines, such as drop hammers, punch presses, and shears on Korfund Vibro Isolators produces these four distinct benefits:

1. **More efficient production line by permitting precision equipment to be located near impact machinery.**
2. **Improved employee efficiency and reduced absenteeism by controlling fatigue-producing vibration.**
3. **Prolonged machine life by preventing shock to machine parts.**
4. **Reduced building maintenance by blocking the transmission of vibratory forces to the building structure.**

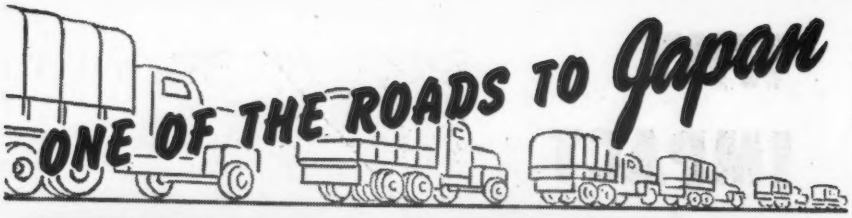
Korfund engineers, with more than forty years of experience in vibration control, are ready to help you solve your vibration problems. Write today for further information.

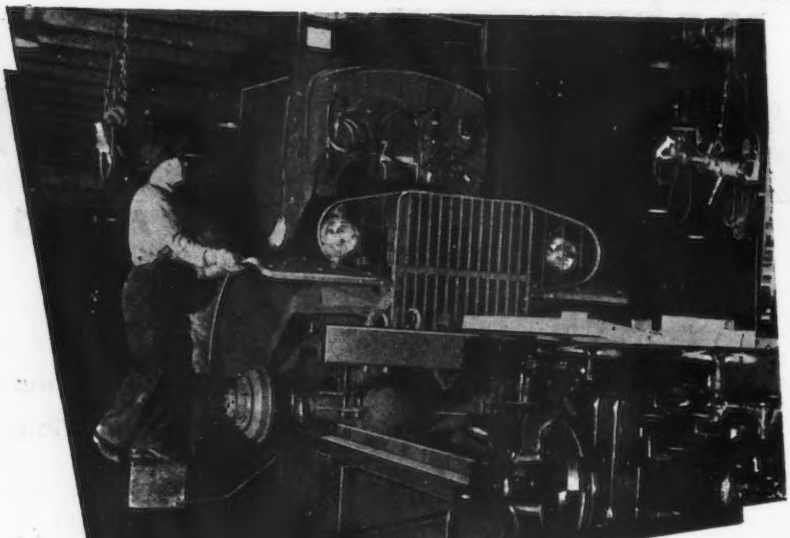
THE KORFUND COMPANY, Inc.
48-35 Thirty-second Place Long Island City 1, N. Y.
Representatives in Principal Cities

KORFUND VIBRATION CONTROL



Metal-cutting shear mounted on Korfund Type SL Vibro Isolators placed at the four corners of the machine base.



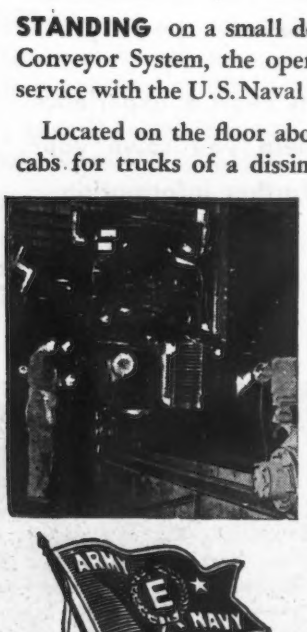


STARTS HERE IN THE U★S★A★

ON THIS A-F ENGINEERED CONVEYOR SYSTEM ★ ★ ★

STANDING on a small dolly temporarily attached to this A-F Engineered Conveyor System, the operator moves along with this truck (destined for service with the U.S. Naval Forces) while the cab is being fastened into place.

Located on the floor above is an A-F Conveyor System, so arranged that cabs for trucks of a dissimilar nature meet the truck unit for which each was designed at just the right moment for efficient handling.



The small photograph shows the same operation for trucks destined for domestic use. In postwar use, too, this A-F Engineered Conveyor System will help make and break production schedules and lower operating costs. May we help your plant do the same? Write today.

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CONVEYING EQUIPMENT

A-F CONVEYORS

Alvey-Ferguson

METAL PRODUCTS CLEANING & FINISHING EQUIPMENT

H. S. S. No noticeable effect.

LIQUID NITRIDING: (40 per cent have applied)

Very good on reamers, form milli cutters, thread hobs and taps for cert types of materials.

Very good results (3).

Medium, 10-15 per cent increase in t life. Fair, 20 per cent increase in t life. Only fair success. Some succe but not enough experience. Is most p ular (of the three), very good. Has proved life about 24 per cent on reame thread chasers, taps, milling cutters a gear shaper cutters. Definitely succe ful on many applications. Have creased run between grinds 25 per c (2). Good, 30 per cent increase in t life (3). When combined with fine finis 100 per cent increase in tool life o tained. Very satisfactory in cutting n ferrous metals and in tipping plasti Good. Some very successful.

Have had very good success, 40 p cent increase in tool life. Have increas production 50 per cent in some cas Has made certain jobs possible, avera increase 100 per cent in life of thre hobs. Has increased drill and reamer l 20 per cent.

350-400 per cent increase in tool li 50-70 per cent longer tool life.

Negative: Not very good on ge shaper cutter. Not much difference note Not enough to warrant added expen No success. Very little success. Spott No consistent success.

CHROMIUM PLATING: (45 per cen have tried)

Very good on plug gages; flash chro plating very good on slotting milli cutters. Fair success. Good, 10 per ce increase in tool life.

25 per cent increase in tool life o tained (3). 30 per cent increase in t life obtained (4). Tool life increas about 34 per cent; brittleness remov by heating plated tool in oil. 50 p cent in tool life obtained (4). Good.

Very good (2). Increased tool li greater stability.

Very good, 100 per cent increase tool life (4). Successful to a modera degree. 200 per cent increase in tool li Have had very good results on ta drills and broaches. Best results fro taps and reamers, also thread hobs. Sa isfactory, 40 per cent increase in t life. Increased production 400 per ce Five times longer life.

Highly satisfactory on light work. the most economical.

Negative: Not very good on ge shaper cutters. Not as generally use as liquid nitriding. Results have be spotty. No success. Has not been helpful as we hoped. Not enough i provement to warrant extra troub Spotty. No consistent success. Not ve successful. Mediocre.

FINE SURFACE FINISH: (46 per cent apply)

Has given very good results. Defini improvement in tool life of 25 to 30 p cent. Some help. Finer finish very su cessful. Some improvement. Greater li when combined with closer control of a gles (25 per cent). Longer tool life, be ter work finish. 50 per cent increase tool life. Results very good, 50 to 1 per cent increase in tool life. Diamo lapping adds 25 per cent to tool life. R sults good enough to know we must co tinue. Tool performance increased 10 20 per cent. Still open to argume among ourselves. Has helped as mu as 300 per cent in some cases.

CLOSER CONTROL OF TOOL ANGLES: (53 per cent use)

Has helped probably more than know. Definite help from angle contr (10 per cent). Good (2). It has helpe 0 per cent increase in tool life and be ter work finish. Central tool grindi generally has probably doubled tool li 100 per cent increase in tool life.

The fact that there were so fe specific comments on closer control tool angles should not be interprete to mean that this point was ove looked. On the contrary, this practic was checked on the questionnai more often than the other four item tabulated above.

Finally, the question was asked,

hat extent have carbides been used replace high speed steel and the st non-ferrous cutting tool mate-ls for machining cast iron, non-rous metals, and steel, respectively. e replies are charted in Figs. 3, and 5.

On the blank the space allowed for eneral comments followed immedi-ely after the question relating to rcentage of shift to the carbides; nce it was natural that many re-lying should confine their remarks this activity. A number of typical plies are listed below:

Success can be obtained with carbides ly when equipment is new or made to and the strain by use of extra equip-ent.

Carbide tipped tools used whenever ssible and find that they save a tre-ndous amount of money due to in-reased production.

We like the idea of tipping tools but our type of work we find the carbides ry satisfactory.

We are beginning to use carbide ream-s and milling cutters with generally od results. A standardization of grade mbers of carbide tools supplied by the rious makers would be of great help us. The men actually using the tools e greatly confused by the variety of ade numbers now used.

Using carbide tips extensively—on face ills—also on machine parts we produce. lan to largely increase our use of car-ide tips. Have not found H. S. S. tips conomical.

Our machining problems are concerned lmost altogether with the facing, drill-g and tapping of cast iron, aluminum nd Naval bronze castings. For this ork (with the exception of course of rilling and tapping) we use carbide pped tools almost exclusively.

We think we have had remarkable sults with carbides. At present we ave not been too impressed with 18-4-1 not that it is not good, for it is) tipped ols.

Production has increased and tool osts have decreased since the introduc-ion of carbide tipped tools. H. S. S. 8-4-1, Mo, and Co types tipped tools ave not been entirely successful on long roduction runs.

Tungsten carbide useless and expen-ive on old machines and some new ones hat are not built rigid enough to take it.

All indications are that more carbide pped tools will be used.

The only reason we cannot use more arbides is lack of speed and power on good many machines.

We think about 80 per cent of all our achining can be done with carbide pped tools eventually. We have con-iderable trouble as it needs widespread ducation of all men on a job.

We use tungsten carbide tipped tools xclusively in all our turning and boring perations on chrome nickel moly steels, ockwell C 30-40. Aso use carbide tipped eamers and milling cutters on a great many operations.

Over 85 per cent of our machining is one with carbides. Only drilling, tap-ing and broaching is done with H. S. S.

When machine tools are improved to urnish the necessary rigidity and in-reased power required, also capable of perating at faster speeds and feeds, the se of carbide tools will be extended.

Carbides are used in preference to all ther materials when the application is economically practicable to our small lot roduction.

We have tried all different grades of ungsten carbide on machine steels but ave had little success; in most cases, igh speed steel is better.

Carbides have proven to outlast and ut produce any high speed or cast non-errous cutting tool. This applies to all etals.

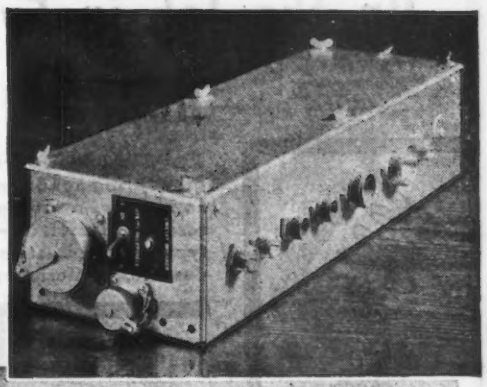
We are still finding new applications or carbide tools. Gradually we will robably apply carbides 100 per cent.

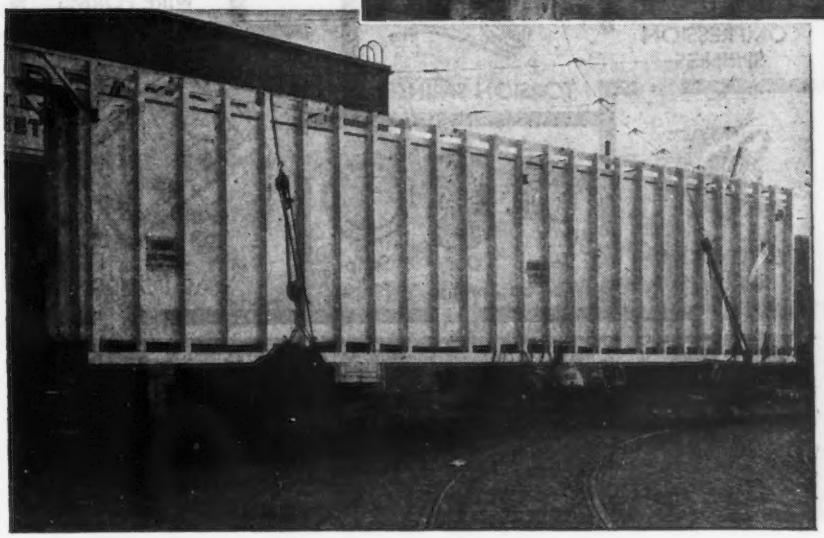
At least 40 per cent of our turning,

Electrical Junction Box (*right*) for use on Martin PBM airplanes. Produced of aluminum, by stamping, welding and punching processes. Built by Brandt of Baltimore.

• • •

30-Ton Plating Tank (*below*) for use with Continuous Electrolytic Tinning Lines. Plating Tank and Tinning Lines engineered, fabricated and installed by Brandt of Baltimore.





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At the present time our production ranges from small formed units to huge fabricated assemblies. Our designers and engineers will welcome the opportunity to assist in planning the details and specifications of your postwar production. Naturally, all plans will be held in strict confidence. So if there is a fabrication or design problem in your postwar plans, we invite you to discuss it with Charles T. Brandt, Incorporated, 1716 Ridgely St., Baltimore 30, Md.

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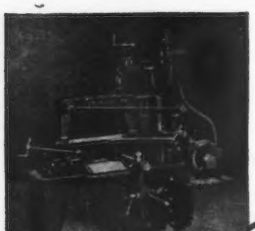

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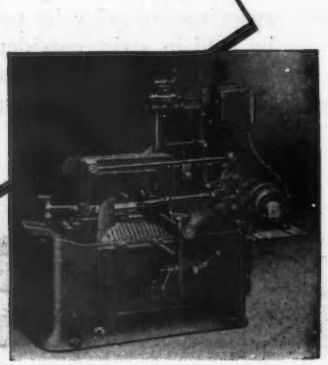
For applications where materials of different hardnesses and alloy characteristics are to be cut, MARVEL 4B is available in 2-Speed and 4-Speed models. Built-in work tracks for holding outer end of bars are also available for all models.



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ARMSTRONG-BLUM MFG. CO.
5700 W. Bloomingdale Ave., Chicago 39, Illinois, U.S.A.

boring, and milling is done with car tipped tools. Most planer tools are insert type—40 per cent of turning, ing, and planing with Armstrong tools.

High speed steel used only on s steel jobs especially where there is intermittent cut or the machine too not in good enough condition to use bides.

Carbides are very rapidly repla high speed steel. Stellite is perform very satisfactorily on a large percen of our steel and armor casting work

These remarks that follow more with the main subject at ha namely, tipping of high speed st

In our experience the tipping of was a necessary measure to cons metals which were critical. We are the present time chrome-plating all ing cutters as they come into our gr ing department. They are resharpe an average of three times and stripped and replated.

Where interrupted cuts are enco tered, H. S. steel is still used to a g extent.

On special jobs we have found using a soft steel shank and arc w ing Toolweld to the shank save consi able time and money. Find that material is better than H. S. steel steel castings which are very dirty (s holes).

Do not think tipping with H. S. very beneficial. However, cast al which are impervious to change un the heat needed to braze can be without inferior results.

My own opinion on H. S. S. tip tools is a lot of wasted effort and ti

We use 7/16 x ½ in. square tool with tool holders exclusively. No tip tool of any nature. Tried tipped several years ago without success.

Very little tipping of high speed s has been done since the extended use carbide tipped tools on applicatio where tipping of high speed steel mi have been done, obviated this necess In the case of milling cutters, inser blades effected economies equivalent tipping.

We use only solid tools for hea planer, lathe and boring mill wo Brazed tools will not stand up on hea intermittent cuts.

In conclusion, some general rema appended to the questionnaire quoted:

Conditions at present are far fr normal and I believe some of th makeshift processes will be much i proved when properly thought out.

To a large extent use OK tool holde which are a form of tipped tool and a bits (high speed, cobalt), Stellite a tungsten carbide in Armstrong holder

We have found that grinding to with constant clearance in direction feed, which can be done by the Burawa method of grinding, increases overall life as much as 100 per cent. Th method insures reproduction of exact t shapes as well as fine finishes, both which features also increases tool life.

Salvaging broken tools by welding brazing costs more than the cutter worth.

Have had remarkable success wi chrome plating on some jobs where the is a lot of wear.

We are gradually more and more lea ing to chrome plate (flash) on hi speed tools for better life and cheap tool cost. With the inexperienced peop now available, cemented carbide too are too costly and chrome plate fills th gap.

Have found that conservation of H. S. S. tools is better served by more atte tion to design, grinding, care in us Tools when worn out are moved on t another operation if the size correspond to needs there. This is easier and mo effective for us than tipping and result are comparable.

During the time high speed tool bi were on critical list, we installed com plete Holden Case equipment and als eliminated the use of high speed ste as far as possible by converting most o our tools to Tantung G and carbide in serts.

...ified Metallurgical Control Effected By Inland Steel Company

...icago

• A unified metallurgical and in-...ction department has been formed ...Inland Steel Co. through the mer-... of an Indiana Harbor works ...allurgical department, Indiana ...bor works inspection department ...d general office department of in-...ction and metallurgy.

The consolidation will effect a uni-...d control over all the metallurgical ...d inspection services of the com-...y and is intended to develop more ...plete correlation of these activ-...s.

...J. Hunter Nead, who has been chief ...tallurgist of Inland, will head the ...w department with his principal ...ce at the Indiana Harbor works. E. ... Martin, at Indiana Harbor works ...d T. S. Washburn, at Chicago, will ...ve as assistant managers.

...L. S. Marsh, who has been man-...er of the general office department ... inspection and metallurgy and ...o has been with the company for ... years, will continue in a special ...tallurgical advisory and consulting ...pacity.

...CF-Brill Merger Becomes Effective

...hiladelphia

•• As of December 31, 1944, The ...G. Brill Co., producer of trolley ...aches and street cars, and The ...C.F. Motors Co., producer of motor ...aches, were liquidated, and their ...sets transferred to ACF-Brill Mo-...rs Co., which company will hence-...rth carry on all the design, manu-...cture and marketing of the types ... vehicles previously handled by the ...o predecessor companies.

The principal officials of the new ...mpany are: Charles J. Hardy, chair-...an of the board; John E. Rovensky, ...airman of the executive committee; ... R. Monroe, president and general ...anager; L. A. Blackford, vice-presi-...nt; C. C. Castle, vice-president; ... H. Corlette, vice-president, transit ...les; F. E. Dayes, vice-president, in-...rcity sales; W. J. Beatty, vice-presi-...nt, foreign sales; H. A. Flogaus, ...ce-president, engineering; Ed. L. ...erter, secretary-treasurer; F. J. Lar-...ns, purchasing agent.

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SUGGESTION SYSTEM DIVISION
349 N. Leamington Ave., Chicago 44, Ill.

British Steel Production Figures Released for Four War Years

New York

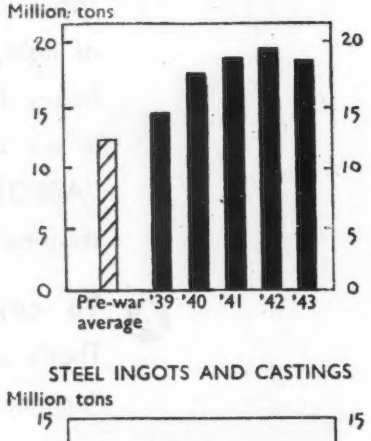
• • • **United Kingdom** steel production for 1943 totaled 13,031,000 tons, according to statistics released recently, and scrap for steelmaking totaled 7,782,000 tons. Feeling that England's overall war position has improved sufficiently to warrant relaxation of security controls, figures have now been released on the overall war production of the United Kingdom through four and a half years of war.

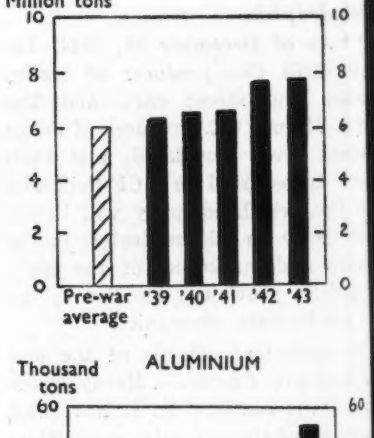
One of the important problems facing the British government during the war years has been to meet the demand of munitions and other industries for essential raw materials and, at the same time, to economize in the use of imported raw materials and semi-finished products. This was particularly important in the case of the iron and steel industry which had previously relied on large imports of iron ore. To that end the domestic output of iron ore was increased by more than one-half since before the war. In spite of the fact that this meant using low-grade home ore instead of high-grade imported ore, the output of pig iron was maintain The total steel production has b consistently above the prewar av age (notwithstanding the need to crease greatly the proportion of al and high-grade steels produced), t limiting the increase in imports wh the activity of the munitions ind tries would otherwise have ma necessary. Another substantial c tribution to the domestic supply steel has been made by a severe c tailment of exports of steel produc

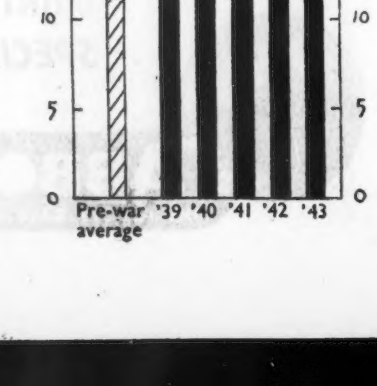
In order to save shipping, salva of many kinds of scrap and wa was intensified and the collection iron and steel scrap for steelmaki has been one-third larger than bef the war. Substantial savings in shi ping space have also been obtain not only by severely restricting t consumption of timber but also increasing home production until, 1943, it was more than four times great as at the outbreak of war.

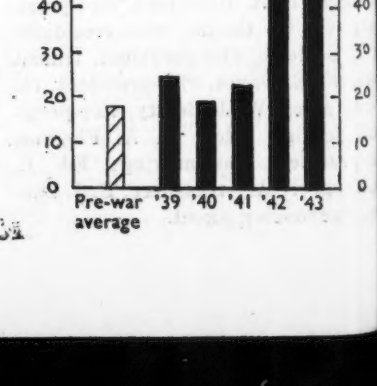
Some outstanding increases in pr duction were made by the light met industry to meet the requirements aircraft and incendiary bomb produ

UNITED KINGDOM PRODUCTION OF RAW MATERIALS









. Magnesium production is more n 11 times the prewar rate.

n some industries output was re- ed in order to save labor or the pping space required for the im- t of raw materials. Thus, in 1943 output of newsprint was only 15 cent of what it was in 1935 and ton yarn output was about 60 per t of its prewar amount.

The tonnage of merchant vessels structed in the United Kingdom in years 1940 to 1943 averaged near- one-fifth more than in the years 5 to 1918. Many of these vessels re of types specially designed to et particular operational and other r needs, such as carrying and lift- very heavy and awkward cargoes, were not adaptable to methods of ss construction. As in the case of val vessels, war experience called an increasing complexity of arma- nt and special equipment. This ogram was carried out in spite of heavy demands of essential naval pbuilding, the difficulties of black- and the large volume of repair rk of all kinds. Repairs to mer- ant vessels absorbed more than half manpower available for merchant rk; this was due to damage caused only by enemy action, but also by abnormal weather met with in the h latitudes frequented by convoys and from North America and Rus- . At one period the amount of rchant shipping in hand for re- ir was over 2½ million gross tons. Out of the reduced total of British ipping available during 1942 and 43, a considerable amount was allo- ted to the armed services either as oopships, naval commissioned ves- s, or for carrying military stores. oreover, a substantial proportion of e ships available were temporarily e because they were undergoing re- irs as a result of damage due to emy action or marine risk. Shipping s also allocated to meet the essen- l needs of the British Empire and llied countries. The greatest economy s, therefore, been needed in every y, not only in speeding up the ovements and turn-round times of e ships available, but in taking into e United Kingdom only those food- uffs and raw materials and manu- ctures which have been considered cessary for the war effort and for eeting essential civilian require- nts.

Before the war, British imports of w and industrial materials aver- ed 26 million tons a year; of this tal nearly 17½ million tons con- sted of steel and steelmaking materials and timber. Economies in imports necessitated by the shipping situation during the war were made mainly in these two groups of materials.

Imports of steel and steelmaking materials as a whole were maintained in the first two years of the war to meet the expanding requirements of the munitions industries, but by 1943 they had been cut to about three million tons below the prewar level. The greatest economy in shipping was obtained by reducing imports of iron ore and scrap, while importing more finished and semi-finished steel.

Tool Orders Must Carry Copy of WPB-542 Certificate

Washington

• • • **Machine tool purchase** orders of the Army, Navy Maritime Commission or their prime and sub-contractors must hereafter be accompanied by photostatic copies of WPB-542 certificates to permit identification with urgent programs, the Tools Division of the War Production Board reports, in amending General Preference Order E-1-b.

Such action will aid WPB and industry in the present urgency for meeting military requirements, WPB officials said.

Machine tool builders were urged by WPB to insist that all customers submit copies of WPB-542 certificates with their orders, officials stressed. Identification of specific WPB-542 certificates, with the armed services programs to which they are related, will be expedited by the photostats or true copies of the certificate, the Tools Division pointed out. The certificates will be screened and countersigned in Washington. In many cases, approval will be limited to specified makes of machine tools and the purchase tied into particular programs.

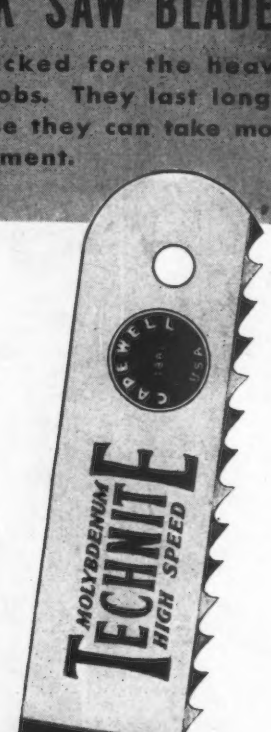
Amendments to order E-1-b also provided for transfer of stationary automotive crankshaft regrinders from jurisdiction of the Automotive Division to the Tools Division, and clarified the listing of die casting machines and wire drawing machines, WPB officials explained.

Crankshaft regrinder will be transferred from Limitation Order L-270, which restricts production of specified automotive equipment, to General Preference Order E-1-b, which controls production and delivery of machine tools.

Tough

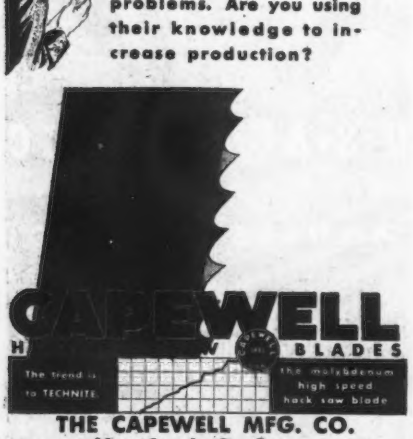
CAPEWELL HACK SAW BLADES

are picked for the heavy, hard jobs. They last longer because they can take more punishment.



AND ON DIFFICULT APPLICATIONS

manufacturers are turning to Capewell Field Engineers. These men have specialized on sawing problems. Are you using their knowledge to increase production?



THE CAPEWELL MFG. CO.
Hartford, 2, Conn.

Special Needs Of Chinese Market Are Described by Chen

New York

• • • If American industry is to develop a bigger market in China after the war, two obstacles which prevented better trade relations in the past will have to be removed, according to K. P. Chen, chairman of the board of the Shanghai Commercial and Savings Bank, Chungking, China, who is visiting this country.

These obstacles, Mr. Chen said, are the beliefs held by the Chinese people that prices of American manufactured products were too high before the war, and the fact that American industry did not have much investment in China.

"In order to prevent our people from considering the prices of your products too high," he told members of the National Association of Manufacturers at a foreign trade session in New York City, "it is necessary for American industry to understand thoroughly the needs of the Chinese market. If the market is worthwhile to you, it requires special treatment as a market and not simply as a depository for surplus stocks. It is important that American industry should supply China those goods that she needs most and supply them on most convenient terms."

Mr. Chen said that immediately after the war China will need cotton textile machinery, and that his people are prepared to pay for it in cash. If American industry can supply such machinery "quickly and economically," a sound basis for future business will have been laid.

Of equal importance, he advised, is the need for products adaptable to local conditions and the necessity of developing among the Chinese people an appreciation of the fine qualities of American products. "In short," Mr. Chen said, "your problem is to apply scientific marketing of your products with special regard to the needs of the Chinese people."

In urging American industry to consider the possibilities of making investments in China, Mr. Chen revealed that his country had bought railway equipment from certain European countries because they had investments in Chinese railways. "The principle that investment and trade go side by side holds as true in China as elsewhere," he said.

However, he said, China does not have its hand out for a loan. Altho she is short of adequate financial sources to complete a major prog of industrialization, her initial n will not be very large. These n will become accelerated when in trialization is fairly well underw

"I wish also to say," Mr. Chen a ed, "that as a practical considera it is of no use to ask for a loan un there is an adequate guarantee t it can be repaid in a reasonable p od. The point I wish to empha is that, in the matter of making fin cial propositions, the initiative c with equal advantage, be taken by American industry instead of the Chinese side."

WPB Revises Rules On Oil Well Suppli

Washington

• • • Approval of Petroleum Adm istration for War's District Offi must now be obtained by Producti Operators before using AA-1 pr erence ratings to get any one of units of oil well drilling-rig equi ment for maintenance and repair p poses. The items were added Schedule B to order P-98-B in a W Amendment recommended by PA In making this announcement Depu Petroleum Administrator Ralph Davies said that the action was tak to encourage the use of repair par rather than of complete new uni Operators requesting complete uni of drilling rigs may use AA-1 pre erence ratings only for the most e sential and urgent needs.

If an operator chooses to use preference rating of AA-2X inste of a higher rating of AA-1 for any the complete units, he may do without first obtaining PAW approv

Mr. Davies pointed out that ope ators may use the AA-1 preferen rating for repair parts for any of t listed items without complying wi the provisions of schedule "B." H stated that manufacturers have bee requested to increase the productio of repair and replacement part rather than of complete units.

The 16 items listed in the revise schedule are: Crown blocks, travelin blocks, hooks or connectors, elevator swivels, grief stems (Kelly's), rotar tables, drawworks, tongs, maste gates, blowout preventers, drill co lars, slush pumps (power or steam driven), boilers, weight indicators an steam drilling engines.

Mercury Price Rise Follows Domestic Producer's Elimination

Paterson, N. J.

• • • **Currently rising mercury prices** present another change in the market trend for that metal since the beginning of the war. Mercury was one of the early scarce items, drawing new producers into the field, the price drop of early 1944 eliminated all but the most economical mines, and the new paucity is bringing this new price rise, according to R. J. McEwen, former chief of the WPB mercury section.

With the entry of the United States into World War II mercury appeared to be in reasonably comfortable supply. The mining industry had rapidly accelerated its production to meet pre-Pearl Harbor demands, but rising requirements created a shortage, and mercury was placed under sharp control by the WPB in early 1942. For the ensuing two years, production and imports continued to respond to the stimulant of a high market price until in late 1944 such a comfortable position was reached that all regulations governing the use of the metal were revoked. At the same time, the Metals Reserve Co. cancelled all existing purchase agreements with the domestic producers and foreign commitments were largely curtailed. In a free market the price of mercury tumbled in six months from the $197.00-$199.00 ceiling to a low of $95.00, reached in July of 1944.

Scarcely had the metal reached its wartime price low in July, 1944, than a new volume demand by the government began to make itself felt and the metal again started rising in price. Today, the supply is short and only recent action by the government in releasing stocks prevented a critical shortage.

The big problem faced by the government in releasing stocks was price. Much of the metal acquired by the Metals Reserve Co. and other procurement agencies has been bought at prices close to the $197.00 ceiling and for the government to hold out for this price and force the market again back to ceiling would merely mean once more reinstating the old subsidy basis which so stimulated production in 1942 and 1943. The decision of the agencies involved was to gear the price to the current market and sell it at a small markup above existing quotations.

Speculation is naturally aroused as to just how this new policy will affect the existing market. The natural inference would be that any policy which increases the supply and lessens the demand would have an eventual deterring influence upon price, but this must wait to be seen. It is the understanding of the writer that it is not the wish of the government to have this new policy create a bearish market, but the true effects will only be seen by developments. At the time of writing the market is advancing sharply.

Bureau of Mines figures indicate that domestic consumption is exceeding production in this country by approximately 1200 flasks per month. These 1200 flasks must be supplied by imports or from stockpiles. Sharp reducing of imports means that more than 600 will have to come from stocks. The Bureau figures also revealed that the domestic production of mercury tumbled from a high of 5000 flasks in October, 1943, to a low of 2500 in August of 1944, cutting domestic production in half in exactly 10 months.

In Idaho, the large new producer of 1942, the Hermes Mine, operated by the Bonanza Mines, Inc., could not operate at the lower prices, and shut down. Most of the production ceased in Texas, Arizona, and Arkansas. In California, the big producing state, important mines such as the Klau and Oat Hill of the Gould interests, the Sulphur Bank and the Mt. Diablo of the Bradley interests, the Falcon, and many others were forced to shut down because of continuing high costs and dropping income.

In Alaska, the major producer has ceased to operate. In Canada, the Pinchi Lake mine of the Consolidated Mining and Smelting Co., Ltd., is reportedly shut down and word is received from Mexico that the Mexican output is well under one-third of what it was two years ago.

The major mines surviving the big cutback are the New Idria, Reed, Abbott, Sonoma and Almaden Mines of California, the Bonanza in Oregon, and the Cordero of Nevada. Most important of these at the present time is New Idria which produces almost as much metal as the rest combined.

During the falling market of 1944, most operators abandoned development and exploration work and concentrated upon salvaging what high grade ore could be marketed. It is doubtful if many operators believe that the price of mercury will move much higher than the $125.00 market and with heavy government stocks and the threat of imports hanging over their heads the major expense of reopening will probably not be justifiable.

NEW IDRIA PLANT: ***Furnace at the California plant at New Idria is believed to be the largest in the world. Main mine workings are over the mountain to the left.***

MACHINE TOOLS

. . . News and Market Activities

Warner and Swasey "Problems" Typical of Overall Manpower Situation

Cleveland

• • • Warner & Swasey, whose manpower situation might be taken as an index to that of the industry generally, has received an order for the production of radar equipment and as of last week it had a shortage of 325 workers. They are making among other things, the electric drive mechanism which will move simultaneously whole batteries of twin mount Bofors anti-aircraft guns as the pointer follows his target. Warner & Swasey has been asked to step up production of this unit by about 42 per cent.

They are also making the high speed driving mechanism for the superchargers used on all high altitude military aircraft. A mechanism so precise that a small drive shaft alone has three dimensions that must be held within 0.0003 in. Furthermore, expanding military programs still require the Warner & Swasey turret lathe, and it is falling behind on delivery. According to Charles J. Stilwell, company president, they cannot build any more of them without additional people. He said the company must have for its numerous high urgency operations over 300 men and women at once. For 200 of the jobs, principally on the second and third shifts, men are needed but in Mr. Stilwell's opinion most of them are jobs which women can do and for which women will have to be hired in view of the male labor shortage.

Fifty men with some definite mechanical skill are required to operate boring mills, planers and radial drills and there are still 50 more jobs scattered through the plant which must be filled but which the company conscientiously believes women should not do. And then there are 35 more jobs which we know are women's jobs that do not necessarily require previous factory experience.

Company officials asserted that as a result of their pioneering in split shifts—two men team together and each works four hours—there are still 30 teams employed but this is only one-fifth of the previous high of 150 teams, which were made up of men who, while working for part time at Warner & Swasey, were engaging in 76 different kinds of businesses and professions. More split shift teams will be hired as soon as they can be found.

And if this were not enough, the recent Cleveland Electric Illuminating Co. dispute which resulted in curtailment of electric power to numerous plants resulted in the company losing important man hours over last week end.

With selective servivce getting tighter it will be even more difficult for companies like this to meet the military programs which will be set for them during the next six months.

•

Tool Engineers Postpone March Planning Exposition

Detroit

• • • The American Society of Tool Engineers, in deference to the domestic transportation crisis, has indefinitely postponed its Industrial Production Planning Exposition scheduled for Cleveland in March, and postponed also its national technical sessions scheduled for that time. D. D. Burnside, president of the Society, stated that the meeting would not be held until it was fully compatible with the nation's war effort.

•

Installs New Packing Method

Detroit

• • • To permit still faster filling of quantity orders from stock of standard Carboloy cemented carbide tools and blanks, Carboloy Co., Inc., here, is now stocking the most widely used types of standard tools and tips "packaged for shipment" in quantities ranging up to 100 per carton. The quantities of tools or blanks per package have been selected according to the quantities or multiples of the quantities of each item most frequently purchased.

Thus, turning, facing, and boring tools are packaged in lots of 12, 6, or 1; standard blanks for these tools in lots of 100, 50, 25, or 10; round boring tools are packaged in lots of 12 or 6; blanks for boring tools in lots of 100, 50, or 25; standard reamer blanks in lots of 100 or 50; standard scraper blanks in boxes of 25; standard pointed nose blanks in lots of 100, 50, or 25; and lathe and grinder center tips in lots of 50, 25, or 10.

•

WMC Aids Manpower Crisis

Cincinnati

• • • Increased WMC efforts aided by the President's recent manpower draft message, has brought a slight improvement in the manpower situation here. While modest, the situation is best exemplified by experience of one or two employers who report that their forces are increased by one or two men on the month's average, thus reversing, momentarily, a trend established during the last half of 1944 in which their average showed more men leaving than they employed. Capacity and skill of current employables, however, are not so high as to cause great rejoicing. New business continues at a fair rate with backlogs at the highest level in the past 13 months. Future bookings now extend to July with more coming in.

•

Machine Tool Restrictions

Washington

• • • Reflecting the growing tightness in needs for war purposes, sales of critical machine tools and equipment can be made until further notice only upon approval of the War or Navy Department. Announcement to this effect has been made by Secretary of Commerce Jesse Jones at the request of the War and Navy Departments and RFC.

•

Ordnance Officers Elected

Cleveland

• • • Col. E. A. Lynn, chief of the Cleveland Ordnance District, and A. J. Weatherhead, Jr., president, the Weatherhead Co., have been elected directors of the Cleveland Post of the Army Ordnance Association.

Clifford F. Hood, president of the American Steel & Wire Co., was reelected president and John C. McHannan board chairman of the Central National Bank, was retained as vice-president. Col. Lynn will serve as secretary-treasurer.

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NON-FERROUS METALS

. . . News and Market Activities

Cadmium Grows Increasingly Critical

Washington

• • • Need for larger quantities of cadmium for military aircraft, tanks and the stepped-up rocket program was disclosed at a recent meeting of the Cadmium Industry Advisory Committee. WPB said that estimated requirements this year are up about 5 per cent over 1944 needs, while there is an indicated drop of 10 per cent in 1945 production under last year's output. Myron Trilsch, deputy director of the Tin-Lead-Zinc Division, said that over-all cadmium stocks had declined approximately 25 per cent from inventories on hand at the start of 1944, and are now considered by division officials to be at a minimum working level. He also reported that the government stockpile had been reduced about one-third during that period.

The need for cadmium is emphasized by the fact that it has become more critical despite conservation by the armed services of 1,500,000 lb. annually by switching from that metal to zinc on alternate plating finishes. Committee members discussed the possible use of other metals to ease the cadmium situation but were unable to recommend any substitute. Recoveries of cadmium metal from scrap were relatively poor, committee members pointed out, which they said was largely due to the difficulty of avoiding impurities.

Division officials pointed out that they had been operating under Cadmium Conservation Order M-65 for about a year, but faced with the current outlook they might be forced to cut the less essential military uses. Civilian uses have been severely curtailed by the order.

A pessimistic view of the 1945 production outlook for the metal was taken because as a by-product of zinc smelting the principal source of cadmium was limited by lack of manpower. The committee agreed that some relief may be afforded through expected increases in lead production, as cadmium is also a by-product of that operation. Furthermore, it was revealed that new equipment at the Bradley Smelter at Kellogg, Idaho, would treat low-grade cadmium flue dust and eventually yield 300,000 lb. of the metal.

Operations at the Bunker Hill zinc smelter were reported only at a 66 per cent rate due to lack of 40 to 50 men.

•

Technological Gains Advance Nonferrous Founders 20 Years

Chicago

• • • The nonferrous foundry industry has advanced 20 years in the past five, H. J. Jacobson, Industrial Pattern Works, told a joint meeting of the nonferrous and ferrous pattern division, Chicago chapter, American Foundrymen's Association here recently.

Rejecting dictionary definitions, Jacobson defined the pattern as "a tool with which a foundry produces castings, the quality of which is sharply reflected in the casting and its dimensional accuracy."

As an example he cited a magnesium casting produced in a local foundry of which, on an initial run of 7000 castings, 1000 were rejected due to faulty "tools." Then, at a total pattern cost of $10,000, the price of the casting was cut 25 per cent, and 30,000 castings were produced at a saving of $187,000. There were only eight rejections despite a close dimensional tolerance. Total scrap loss was only 0.5 per cent. He pointed out that $45,000 or more could have been saved on the first 7000 castings, had the revised setup been adopted originally.

A vertical mill and duplicator were used for production of these patterns, which were machined all over. The master pattern was made with an allowance of 1/16 to ⅛ in., it being pointed out that if the pattern were machined to exact blueprint dimensions without a safety factor and the casting were on the thin side, it would be rejected. If on the plus side, it would be accepted and machined to size.

Jacobson declared that permanent mold castings were a threat to the sand foundry industry and said that "unless the sand foundry can produce accurately, permanent mold shops will take a large part of production work after the war."

o o o

Wire Mills Notify WPB Before Scheduling Z-1

Washington

• • • WPB has issued direction 60 to CMP Regulation 1 requiring copper wire mills to notify the Board's Copper Division 10 days in advance of scheduling orders bearing Z-1 allotments. The direction provides for the substitution of Army and Navy orders for such deferred orders. Division officials said that the Army Signal Corps demand will require the fullest utilizations of copper wire mill facilities. The new direction parallels the action taken Dec. 28 requiring brass mills to give five days' notice to the Copper Division before scheduling deferred orders.

Copper mills are also required to furnish WPB with information regarding the amount and identification of type of copper mill products involved in such orders and also to advise WPB as soon as possible regarding "Z" orders that have been scheduled before date of issuance of this direction but not yet put into production.

In any event, brass and copper wire mills located in critical labor areas and having unfilled requisitions with uses will not be in a position to accept or schedule "Z" orders even though handled on a deferred basis.

•

Gas Shortage Closes Foundry

Cincinnati

• • • Last week the magnesium foundry of the Wright Aeronautical Corp. at Lockland, Ohio, was closed down until further notice because of the oncoming cold wave and the further shortage of gas. The Lockland plant is one of several producing engines for the B-29.

Primary Metals

(Cents per lb., unless otherwise noted)

Aluminum, 99+%, del'd. (Min. 10,000 lb.)	15.00
Antimony, American, Laredo, Tex.	14.50
Beryllium copper, 3.75-4.25% Be; dollars per lb. contained Be	$17.00
Cadmium, del'd	90.00
Cobalt, 97-99% (per lb.)	$1.50 to $1.57
Copper, electro, Conn. valley	12.00
Copper, electro, New York	11.75
Copper, lake	12.00
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.5%, dollars per troy oz.	$4.50
Iridium, dollars per troy oz.	$120.00
Lead, St. Louis	6.35
Lead, New York	6.50
Magnesium, 99.9 + %, carlots	20.50
Magnesium, 12-in. sticks, carlots	27.50
Mercury, dollars per 76-lb. flask, f.o.b. New York	$155.00 to $160.00
Nickel, electro	35.00
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per oz.	$35.00
Silver, open market, New York, cents per oz.	44.75
Tin, Straits, New York	52.00
Zinc, East St. Louis	8.25
Zinc, New York	8.65

Remelted Metals

(Cents per lb. unless otherwise noted)

Aluminum, No. 12 Fdy. (No. 2)	9.00 to 10.00
Aluminum, deoxidizing No. 2, 3, 4	6.00 to 9.50
Brass Ingot	
85-5-5-5 (No. 115)	13.25
88-10-2 (No. 215)	16.75
80-10-10 (No. 305)	16.00
No. 1 Yellow (No. 405)	10.25

Copper, Copper Base Alloys

(Mill base, cents per lb.)

	Extruded Shapes	Rods	Sheets
Copper	20.87	....	20.87
Copper, H.R.	....	17.37	....
Copper drawn	....	18.37	....
Low brass, 80%	....	20.40	20.15
High brass	....	....	19.48
Red brass, 85%	....	20.61	20.36
Naval brass	20.37	19.12	24.50
Brass, free cut	....	15.01	....
Commercial bronze, 90%	....	21.32	21.07
Commercial bronze, 95%	....	21.53	21.28
Manganese bronze	24.00	....	28.00
Phos. bronze, A, B, 5%	....	36.50	36.25
Muntz metal	20.12	18.87	22.75
Everdur, Herculoy, Olympic or equal	....	25.50	26.00
Nickel silver, 5%	....	28.75	26.50
Architect bronze	19.12	....	....

Aluminum

(Cents per lb., subject to extras on gage, size, temper, finish, factor number, etc.)

Tubing: 2 in. O.D. x 0.065 in. wall 2S, 40c. (½H); 52S, 61c. (O); 24S, 67½c. (T).

Plate: 0.250 in. and heavier; 2S and 3S, 21.2c.; 52S, 24.2c.; 61S, 22.8c.; 24S, 24.2c.

Flat Sheet: 0.188 in. thickness; 2S and 3S, 22.7c. a lb.; 52S, 26.2c.; 61S, 24.7c.; 24S, 26.7c.

2000-lb. base for tubing; 30,000-lb. base for plate, flat stock.

Extruded Shapes: "As extruded" temper; 2000-lb. base, 2S and 3S, factor No. 1 to 4, 25.5c.; 14S, factor No. 1 to 4, 35c.; 17S, factor No. 1 to 4, 31c.; 24S, factor No. 1 to 4, 34c.; 53S, factor No. 1 to 4, 28c.; 61S, factor No. 1 to 4, 28½c.

The factor is determined by dividing perimeter of shape by weight per lineal foot.

Wire Rod and Bar: Base price; 17ST and 11ST-3, screw machine stock. Rounds: ¼ in., 28½c. per lb.; ½ in., 26c.; 1 in., 24½c.; 2 in., 23c. Hexagonals; ¼ in., 34½c. per lb.; ½ in., 28½c.; 1 in., 25½c.; 2 in., 25½c. 2S, as fabricated, random or standard lengths, ¼ in., 24c. per lb.; ½ in., 25c.; 1 in., 24c.; 2 in., 23c. 24ST, rectangles and squares, random or standard lengths. 0.093-0.187 in. thick by 1.001-2.000 in. wide, 33c. per lb.; 0.751-1.500 in. thick by 2.001-4.000 in. wide, 29c.; 1.501-2.000 in. thick by 4.001-6.000 in. wide, 27½c.

Magnesium

Sheet, rod, tubes, bars, extruded shapes subject to individual quotations. Metal turnings: 100 lb. or more, 46c. a lb.; 25 to 90 lb., 56c.; less than 25 lb., 66c.

NON-FERROUS SCRAP METAL QUOTATIONS

†*(OPA basic maximum prices, cents per lb., f.o.b. point of shipment, subject to quality, quantity and special preparation premiums—other prices are current quotations)*

Copper, Copper Base Alloys

OPA Group 1†	
No. 1 wire, No. 1 heavy copper	9.75
No. 1 tinned copper wire, No. 1 tinned heavy copper	9.75
No. 2 wire, mixed heavy copper	8.75
Copper tuyeres	8.75
Light copper	7.75
Copper borings	9.75
No. 2 copper borings	8.75
Lead covered copper wire, cable	6.00*
Lead covered telephone, power cable	6.04
Insulated copper	5.10*
OPA Group 2†	
Bell metal	15.50
High grade bronze gears	13.25
High grade bronze solids	11.50*
Low lead bronze borings	11.50*
Babbitt lined brass bushings	13.00
High lead bronze solids	10.00*
High lead bronze borings	10.00*
Red trolley wheels	10.75
Tinny (phosphor bronze) borings	10.50
Tinny (phosphor bronze) solids	10.50
Copper-nickel solids and borings	9.25
Bronze paper mill wire cloth	9.50
Aluminum bronze solids	9.00
Soft red brass (No. 1 composition)	9.00
Soft red brass borings (No. 1)	9.00
Gilding metal turnings	8.50
Contaminated gilded metal solids	8.50
Unlined standard red car boxes	8.25
Lined standard red car boxes	7.75
Cocks and faucets	7.75
Mixed brass screens	7.75
Red brass breakage	7.50
Old nickel silver solids, borings	6.25
Copper lead solids, borings	6.25
Yellow brass castings	6.25
Automobile radiators	7.00
Zincy bronze borings	8.00
Zincy bronze solids	8.00
OPA Group 3†	
Fired rifle shells	8.25
Brass pipe	7.50
Old rolled brass	7.00
Admiralty condenser tubes	7.50
Muntz metal condenser tubes	7.00
Plated brass sheet, pipe reflectors	6.50
Manganese bronze solids	7.25[1]
Manganese bronze solids	6.25[2]
Manganese bronze borings	6.50[1]
Manganese bronze borings	5.50[2]
OPA Group 4†	
Refinery brass	4.75*

*Price varies with analysis. [1] Lead content 0.00 to 0.40 per cent. [2] Lead content 0.41 to 1.00 per cent.

Other Copper Alloys

Briquetted Cartridge Brass Turnings	8.625
Cartridge Brass Turnings, Loose	7.375
Loose Yellow Brass Trimmings	7.375

Aluminum

Plant scrap, segregated	
2S solids	8.50
Dural alloys, solids 14, 17, 18, 24S	8.50
25S turnings, dry basis	2.25
Low copper alloys 51, 52, 61, 63S solids	6.00
turnings, dry basis	4.00
Plant scrap, mixed	
Solids	3.00
Turnings, dry basis	2.25
Obsolete scrap	
Pure cable	7.00
Old sheet and utensils	5.00
Old castings and forgings	4.50
Pistons, free of struts	4.00
Pistons, with struts	2.00
Old alloy sheet	3.50

Magnesium*

Segregated plant scrap	
Pure solids and all other solids, exempt Borings and turnings	1.50
Mixed, contaminated plant scrap	
Grade 1 solids	3.00
Grade 1 borings and turnings	2.00
Grade 2 solids	2.00
Grade 2 borings and turnings	1.00

*Nominal.

Zinc

New zinc clippings, trimmings	6.00
Engravers, lithographers plates	6.00
Old zinc scrap	4.75
Unsweated zinc dross	5.00
Die cast slab	4.50
New die cast scrap	4.45
Radiator grilles, old and new	3.50
Old die cast scrap	3.00

Lead

Deduct 0.55c. a lb. from refined metal basing point prices or soft and hard lead including cable, for f.o.b. point of shipment price.

Nickel

Ni content 98+%, Cu under ½%, 26c. per lb.; 90 to 98% Ni, 26c. per lb. contained Ni.

ELECTROPLATING ANODES AND CHEMICALS

Anodes

(Cents per lb., f.o.b. shipping point)

Copper: Cast, elliptical, 15 in. and longer	25½
Electrolytic, full size	22½
cut to size	30½
Rolled, oval, straight, 15 in. and longer	23¼
Curved	24¼
Brass Cast, 82-20, elliptical, 15 in. and longer	23½
Zinc: Cast, 99.99, 16 in. and over	16¼
Nickel: 99% plus, cast	47
Rolled, depolarized	48
Silver: Rolled, 999 fine per Troy (1-9) oz., per oz.	53

Chemicals

(Cents per lb., delivery from New York)

Copper cyanide, tech., 100-lb. bbls. 1-5	5.65
Copper sulphate, 99.5 crystals, bbls.	13.00-13.50
Nickel salts, single, 425-lb. bbls.	34.00
Silver cyanide, 100 oz. lots	40.82-41.125
Sodium cyanide, 96% dom., 100-lb. dms.	0.15
Zinc, cyanide, 100-lb. dms.	33.00
Zinc, sulphate, 89% crystals, bbls.	6.80

SCRAP

. . . News and Market Activities

Alloy Scrap Problem Requires Solution

• • • **Dealers are often critical** of the good faith of mills in rejecting shipments of scrap and this is probably due to the way the mills' view of contaminated scrap can be adjusted to suit the available supplies—at least that was the crux of views expressed at the scrap convention. Dealers are quick to point out that the inadequate labor supply has handicapped them in careful segregation of scrap grades, and that the magnetic cranes can readily lift small pieces of non-ferrous metal in a load of steel scrap.

This matter is brought to attention this week because, in predicting a bright future for the scrap trade in postwar competition with iron ore and pig iron, Warren M. Huff of the Iron and Steel Branch of OPA stated at Cincinnati that in order to enjoy this prosperity it would be necessary for the industry to clean up its product and maintain better standards of quality.

FOR NEWS OF THE CINCINNATI SCRAP CONVENTION SEE PAGE 103.

Dealers ask what is to be done with alloy scrap. Unless the steel industry and WPB are able to work out some means of utilizing increased quantities in current steel production, this type of scrap represents a resource not fully utilized at a time when there is talk of the early closing down of some open hearth production for lack of sufficient scrap. Moreover it represents a frozen asset to dealers who are reluctant to take it from producers. There is no incentive to dealers under present conditions to segregate alloy scrap and it is demoralizing to plants endeavoring to segregate conscientiously to find the collector or dealer making no effort to maintain the segregation.

•

Hyman-Michaels Resignations

Chicago

• • • **Resignation of Sparrow E. Purdy** as president of Hyman-Michaels Co., effective Feb. 1, and formation by him of the Purdy Co. was announced here last week.

Activities of the new firm will be similar to those of Hyman-Michaels in the scrap, used railroad equipment, and allied fields. Principal offices of both firms are at 122 South Michigan Ave., Chicago. Hyman-Michaels also maintains offices and plants at St. Louis, New York, San Francisco, Los Angeles, Portland, Ore., Norfolk, Va., and Washington, D. C. The Purdy Co. is opening Chicago plants and anticipates opening branch offices and plants in various parts of the country.

Other Hyman-Michaels officials resigning to join the new firm are J. P. Purdy and John I. Duffy, son and son-in-law respectively of Sparrow E. Purdy and both Hyman-Michaels vice-presidents, and M. H. Barnes, general auditor and assistant secretary of Hyman-Michaels.

Sparrow E. Purdy has been associated with Hyman-Michaels for 37 years, for many of them vice-president and general manager.

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Luria Office in St. Louis

Philadelphia

• • • **Luria Brothers & Co., Inc.,** Philadelphia, opened a branch office in St. Louis, with J. L. Gordon as district manager. Mr. Gordon had been associated with the company at Houston, Tex.

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PITTSBURGH—With all scrap prices at ceilings, the supply situation is very difficult. Dealers here indicate that mills will buy any grade at ceiling prices and are willing to pay springboards. Some New England material is moving into Pittsburgh and dealers state there is a growing tendency for consumers to reach out for remote scrap. While there have been no known remote purchases in this area yet, there have been some shipments into Ohio.

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CHICAGO—Most grades are firmly established at ceilings with exception of secondary blast furnace grades and machine shop turnings which are at somewhat lower indeterminate levels. Certain railroad specialties have not yet become entrenched at ceiling levels here even though under allocation in other parts of the country.

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DETROIT — Scrap movement was rather slow this week, with labor scarcities keenly evident again at many yards and the continued presence of snow on the ground and in the air acting as a barrier to shipment. Expected movement of turnings to the open hearths in heavy volume has not yet materialized. Prices remain about the same on these light grades, although it was heard that a shipment of industrial turnings, choice stock, had been made at the $14.32 ceiling price.

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CLEVELAND—Prices are at ceilings here, and there is a great demand for scrap, the movement of which has been paralyzed by the weather. Allocations have been made in instances where mills have been unable to get scrap through regular channels and delays in transportation have forced them to make big inroads into their reserves. Shipments are off as much as 25 per cent. Cast, which has been scarce, is even scarcer. Electric furnace is getting tight too.

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ST. LOUIS—Bundled sheets, axle turnings and steel angle bars are the latest items on the scrap list to reach ceiling prices again. The supply of scrap is light as a result of bad weather and a shortage of manpower. Receipts in this market for the last 30 days are estimated to be 50 per cent below the preceding period.

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BOSTON—Heavy snow and near zero weather plus a shortage of most wanted grades have pulled scrap shipments down to a minimum. A sizable percentage of shipyard scrap produced is being allocated. Buyers have become fussy regarding shoveling turnings, which have to be guaranteed free of alloys to fetch $12.05 a ton on cars Boston, the ceiling. Foundry scrap is so scarce, some use as high as 70 per cent pig iron in charge.

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NEW YORK—Even shoveling turnings have reached ceiling this week in this district. Cold weather, snow and shortage of labor continue to limit yard activities. However one broker is not optimistic about the prospects for increasing the flow of scrap even when the cold weather abates, for current supplies are comprised of producer scrap and there is no obsolescent scrap in evidence. One mill buyer is said to have made the suggestion recently that prisoners of war be made available to scrap dealers to tide them over the labor shortage.

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BIRMINGHAM—Supplies in this market remain plentiful and there are reports that material here may be allocated to northern mills to meet a heavier demand. Lack of manpower continues to be felt, particularly in the preparation of scrap.

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TORONTO—For the past three or four weeks heavy snow and impassable roads have created transportation problems for the movement of iron, steel and scrap. There has been little movement of scrap into or out of dealers' yards since the latter part of December and there is no indication of early relief. Steel shipments have been two to three weeks behind schedule, but so far there are no reports as to suspension of production because of lack of raw materials although at the height of the storm workers were unable to reach plants and some closed for three or four days.

Going prices as obtained in the trade by IRON AGE editors, based on representative tonnages (for ceiling prices see O. P. A. schedule No. 4). Where ceiling prices are quoted they do not include brokerage fee or adjusted freight.

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. melting	$20.00
RR. hvy. melting	21.00
No. 2 hvy. melting	20.00
RR. scrap rails	21.50
Rails 3 ft. and under	23.50
No. 1 comp'd sheets	20.00
Hand bdld. new shts.	20.00
Hvy. axle turn.	19.00
Hvy. steel forge turn.	19.00
Mach. shop turn.	15.00
Short shov. turn.	17.00
Mixed bor. and turn.	15.00
Cast iron borings	16.00
Hvy. break. cast	16.50
No. 1 cupola	20.00
RR. knuck. and coup.	24.50
RR. coil springs	24.50
Rail leaf springs	24.50
Rolled steel wheels	24.50
Low phos. billet crops	24.45
Low phos.	22.50
RR. malleable	22.00

CHICAGO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$18.75
No. 2 hvy. melting	18.75
No. 1 bundles	18.75
No. 2 dealers' bndls.	18.75
Galv. bundles	16.25 to 16.75
Mach. shop turn.	12.50 to 13.00
Short shoveling turn.	15.25 to 15.75
Cast iron borings	13.75 to 14.25
Mix. bor. & short turn.	12.75 to 13.25
Low phos. hvy. forge	23.75
Low phos. plates	21.25
No. 1 RR hvy. melting	19.75
Reroll rails	22.25
Cut rails, 3 ft. and under	22.25
Locomotive tires, cut	22.25 to 22.75
Cut bolsters & side frames	19.75 to 20.25
Angles & splice bars	22.25
St'dard stl. car axles	25.75
No. 3 steel wheels	20.75 to 21.25
Couplers & Knuckles	21.50 to 22.00
Miscellaneous rails	20.25
Agricul. malleable	21.00 to 21.50
RR. malleable	22.00
No. 1 mach. cast	20.00
No. 1 agricul. cast	20.00
Cast iron car wheels	20.00
Hvy. breakable cast.	16.50
RR. grate bars	15.25
Brake shoes	15.25
Stove plate	19.00
Clean auto cast	20.00

CINCINNATI

Per gross ton delivered to consumer:

No. 1 hvy. melting	$18.00 to $18.50
No. 2 hvy. melting	18.00 to 18.50
No. 1 bundles	18.00 to 18.50
No. 2 bundles	18.00 to 18.50
Mach. shop turn.	8.50 to 9.00
Shoveling turn.	10.50 to 11.00
Cast iron borings	10.50 to 11.00
Mixed bor. & turn.	9.50 to 10.00
No. 1 cupola cast	21.00
Hvy. breakable cast.	16.50
Low phos. plate	20.50 to 21.50
Scrap rails	20.00 to 21.00
Stove plate	16.00 to 16.50

BOSTON

Dealers' buying prices per gross ton, f.o.b. cars

No. 1 hvy. melting	$15.05
No. 2 hvy. melting	15.05
Busheling	15.05
No. 1 and 2 bundles	15.05
Turnings, shovelings	$11.06 to 12.05
Turnings, regular	9.06 to 10.05
Mixed bor. & turn.	10.05
Clean cast, chem. bor.	13.06 to 14.15
Breakable cast	21.57 to 21.87
Stove plate	20.00 to 23.51
Machinery cast, truck	21.00 to 23.51

DETROIT

Per gross ton, brokers' buying prices:

No. 1 hvy. melting	$17.32
No. 2 hvy. melting	17.32
No. 1 bundles	17.32
New busheling	17.32
Mach. shop turn.	$10.00 to 10.50
Short shov. turn.	12.50 to 13.25
Cast iron borings	12.25 to 12.75
Mixed bor. & turn.	10.00 to 10.50
No. 1 cupola cast	20.00
Charging box cast	15.50 to 16.50
Hvy. breakable cast.	15.00 to 16.00
Stove plate	18.50 to 19.00
Flashings	17.32
Low phos. plate	18.50 to 19.82
Automotive cast	20.00

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. melting	$18.75
No. 2 hvy. melting	18.75
No. 2 bundles	18.75
Mach. shop turn.	13.75
Shoveling turn.	15.75
Cast iron borings	14.75
Mixed bor. & turn.	13.75
No. 1 cupola cast	20.00
Hvy. breakable cast.	16.50
Cast, charging box	19.00
Hvy. axle, forge turn.	18.25
Low phos. plate	21.25
Low phos. punchings.	21.25
Billet crops	21.25
RR. steel wheels	23.25
RR. coil springs	23.25
RR. malleable	22.00

ST. LOUIS

Per gross ton delivered to consumer:

Hvy. melting	$17.50
No. 1 locomotive tires	20.00
Misc. stand. sec. rails	19.00
Railroad springs	22.00
Bundled sheets	17.50
Heavy axle turn.	16.75
Machine shop turn.	10.00 to 10.50
Rerolling rails	21.00
Steel car axles	21.50 to 22.00
Steel rails under 3 ft.	21.50
Steel angle bars	21.00
Cast iron car wheels	20.00
No. 1 machinery cast	20.00
Railroad malleable	21.00 to 21.50
Breakable cast	16.50
Stove plate	17.00
Grate bars	15.25
Brake shoes	15.25

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting	$17.00
No. 2 hvy. melting	17.00
No. 2 bundles	17.00
No. 1 busheling	17.00
Scrap rails	18.50
Rails for rerolling	20.50
Rails 3 ft. & under	21.00
Angles & splice bars	20.50
Long turn.	$8.50 to 9.00
Cast iron borings	8.50 to 9.00
Steel axles	18.00
Stove plate	17.50
Bar crops and plate	19.50
Structural and plate	19.50
No. 1 cast	20.00
Cast iron carwheels	16.50 to 17.00

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. melting	$20.00
No. 2 hvy. melting	20.00
Low phos. plate	22.50
No. 1 busheling	20.00
Hydraulic bundles	20.00
Mach. shop turn.	13.50 to 14.00
Short shovel. turn.	16.00 to 16.50
Cast iron borings	15.00 to 15.50

NEW YORK

Dealers' buying prices, per gross ton, on cars:

No. 1 hvy. melting	$15.33
No. 2 hvy. melting	15.33
Hyd. comp. black bundles	15.33
Hyd. comp. galv. bundles	13.33
Hvy. breakable cast.	16.50
Charging box cast	19.00
No. 1 cupola cast	20.00
Clean auto cast	20.00
Unstrip. motor blks.	17.50
Stove plate	19.00
Clean chem. cast bor.	14.33
Mach. shop turn.	10.33
Mixed bor. & turn.	10.33

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$19.25
No. 1 bundles	19.25
No. 2 bundles	19.25
No. 2 hvy. melting	19.25
Mach. shop turn.	14.25
Shoveling turn.	16.25
Cast iron borings	15.25
Mixed bor. & turn.	14.25
No. 1 cupola cast	20.00
Stove plate	19.00
Low phos. plate	21.75
Scrap rails	20.75
Rails 3 ft. & under	22.75
RR. steel wheels	23.75
Cast iron car wheels	20.00
RR. coil & leaf sprgs.	23.75
RR. knuckles & coup.	23.75
RR. malleable	22.00
No. 1 busheling	19.25

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. melting	$19.50
No. 2 hvy. melting	19.50
Compressed sheet stl.	19.50
Drop forge flashings	19.00
No. 2 bundles	19.50
Mach. shop turn.	14.50
Short shovel.	16.50
No. 1 busheling	19.50
Steel axle turn.	18.00
Low phos. billet and bloom crops	23.66
Cast iron borings	15.50
Mixed bor. & turn.	14.50
No. 2 busheling	17.00
No. 1 machine cast.	20.00
Railroad cast	20.00
Railroad grate bars.	15.25
Stove plate	19.00
RR. hvy. melting	20.50
Rails 3 ft. & under	23.00
Rails 18 in. & under	24.25
Rails for rerolling	23.00
Railroad malleable	22.00
Elec. furnace punch.	22.00

SAN FRANCISCO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$15.50 to $16.25
RR. hvy. melting	15.50 to 16.25
No. 2 hvy. melting	14.50 to 15.25
No. 2 bales	13.50 to 14.25
No. 3 bales	9.50 to 10.59
Mach. shop turn.	7.00
Elec. furn. 1 ft., under	15.50 to 17.00
No. 1 cupola cast	19.00 to 21.00

LOS ANGELES

Per gross ton delivered to consumer:

No. 1 hvy. melting	$14.00 to $15.00
No. 2 hvy. melting	13.00 to 14.00
No. 2 bales	12.00 to 13.00
No. 3 bales	9.00 to 10.00
Mach. shop turn.	4.50
No. 1 cupola cast	19.00 to 21.00

SEATTLE

Per gross ton delivered to consumer:

No. 1 hvy. melting	$13.50
RR. hvy. melting	13.50
No. 3 bundles	11.50
Elec. furn. 1 ft., und.	$16.00 to 17.00
No. 1 cupola cast	20.00

Comparison of Prices . . .

Advances Over Past Week in **Heavy Type**; Declines in *Italics*. (Prices Are F.O.B. Major Basing Points)

Flat Rolled Steel: (Cents Per Lb.)	Jan. 16, 1945	Jan. 9, 1945	Dec. 12, 1944	Jan. 18, 1944
Hot rolled sheets	2.20	2.10	2.10	2.10
Cold rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.65	3.50	3.50	3.50
Hot rolled strip	2.10	2.10	2.10	2.10
Cold rolled strip	2.80	2.80	2.80	2.80
Plates	2.20*	2.10	2.10	2.10
Plates, wrought iron	3.80	3.80	3.80	3.80
Stain's c.r. strip (No. 302)	28.00	28.00	28.00	28.00

* Mill edge plates from strip mills 2.10 cents per Lb.

Tin and Terne Plate: (Dollars Per Base Box)				
Tin plate, standard cokes	$5.00	$5.00	$5.00	$5.00
Tin plate, electrolytic	4.50	4.50	4.50	4.50
Special coated mfg. ternes	4.30	4.30	4.30	4.30

Bars and Shapes: (Cents Per Lb.)				
Merchant bars	2.15	2.15	2.15	2.15
Cold finished bars	2.65	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Stainless bars (No. 302)	24.00	24.00	24.00	24.00
Wrought iron bars	4.40	4.40	4.40	4.40

Wire and Wire Products: (Cents Per Lb.)				
Plain wire	2.60	2.60	2.60	2.60
Wire nails	2.80	2.55	2.55	2.55

Rails: (Dollars Per Gross Ton)				
Heavy rails	$43.00	$40.00	$40.00	$40.00
Light rails	43.00	40.00	40.00	40.00

Price of light rails made from rail steel is incorrectly shown on p. 159 at $42.00 per gross ton. The correct price is $39.00.

Semi-Finished Steel: (Dollars Per Gross Ton)				
Rerolling billets	$34.00	$34.00	$34.00	$34.00
Sheet bars	34.00	34.00	34.00	34.00
Slabs, rerolling	34.00	34.00	34.00	34.00
Forging billets	40.00	40.00	40.00	40.00
Alloy blooms, billets, slabs	54.00	54.00	54.00	54.00

Wire Rods and Skelp: (Cents Per Lb.)				
Wire rods	2.00	2.00	2.00	2.00
Skelp	1.90	1.90	1.90	1.90

Pig Iron: (Per Gross Ton)	Jan. 16, 1945	Jan. 9, 1945	Dec. 12, 1944	Jan. 18, 1944
No. 2 fdy., Philadelphia	$25.84	$25.84	$25.84	$25.84
No. 2, Valley furnace	24.00	24.00	24.00	24.00
No. 2, Southern Cin'ti	25.11	25.11	25.11	23.94
No. 2, Birmingham	20.38	20.38	20.38	20.38
No. 2, foundry, Chicago†	24.00	24.00	24.00	24.00
Basic, del'd eastern Pa.	25.34	25.34	25.34	25.34
Basic, Valley furnace	23.50	23.50	23.50	23.50
Malleable, Chicago†	24.00	24.00	24.00	24.00
Malleable, Valley	24.00	24.00	24.00	24.00
L. S. charcoal, Chicago	37.34	37.34	37.34	37.34
Ferromanganese‡	135.00	135.00	135.00	135.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton.
‡For carlots at seaboard.

Scrap: (Per Gross Ton)				
Heavy melt'g steel, P'gh.	$20.00	$20.00	$20.00	$20.00
Heavy melt'g steel, Phila.	18.75	18.75	18.75	18.75
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	18.75
No. 1 hy. comp. sheet, Det.	17.32	17.32	17.32	17.85
Low phos. plate, Youngs'n	22.50	22.50	22.25	22.50
No. 1 cast, Pittsburgh	20.00*	20.00*	20.00*	20.00
No. 1 cast, Philadelphia	20.00*	20.00*	20.00*	20.00
No. 1 cast, Chicago	20.00*	20.00*	20.00*	20.00

*F.o.b. shipping point.

Coke, Connellsville: (Per Net Ton at Oven)				
Furnace coke, prompt	$7.00	$7.00	$7.00	$7.00
Foundry coke, prompt	8.25	8.25	8.25	8.25

Non-Ferrous Metals: (Cents Per Lb. to Large Buyers)				
Copper, electro., Conn.	12.00	12.00	12.00	12.00
Copper, Lake	12.00	12.00	12.00	12.00
Tin (Straits), New York	52.00	52.00	52.00	52.00
Zinc, East St. Louis	8.25	8.25	8.25	8.25
Lead, St. Louis	6.35	6.35	6.35	6.35
Aluminum, Virgin, del'd.	15.00	15.00	15.00	15.00
Nickel, electrolytic	35.00	35.00	35.00	35.00
Magnesium, ingot	20.50	20.50	20.50	20.50
Antimony, Laredo, Tex.	14.50	14.50	14.50	14.50

The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 153-161.

Composite Prices . . .

Starting with the issue of April 22, 1943, the weighted finished steel price index was revised for the years 1941, 1942 and 1943. See explanation of the change on page 90 of the April 22, 1943, issue.

	FINISHED STEEL	PIG IRON	SCRAP STEEL
January 16, 1945	2.334075c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One week ago	2.30837c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One month ago	2.30837c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One year ago	2.25513c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton

	FINISHED STEEL HIGH	FINISHED STEEL LOW	PIG IRON HIGH	PIG IRON LOW	SCRAP STEEL LOW	SCRAP STEEL HIGH
1944	2.30837c., Sept. 5	2.272349c., Jan. 4	$23.61	$23.61	$15.67 Oct. 24	$19.17
1943	2.25513c.,	2.25513c.,	23.61	23.61	19.17	19.17
1942	2.26190c.,	2.26190c.,	23.61	23.61	19.17	19.17
1941	2.43078c.,	2.43078c.,	$23.61, Mar. 20	$23.45, Jan. 2	$19.17, Apr. 10	$22.00, Jan. 7
1940	2.30467c., Jan. 2	2.24107c., Apr. 16	23.45, Dec. 23	22.61, Jan. 2	16.04, Apr. 9	21.83, Dec. 30
1939	2.35367c., Jan. 3	2.26689c., May 16	22.61, Sept. 19	20.61, Sept. 12	14.08, May 16	22.50, Oct. 3
1938	2.58414c., Jan. 4	2.27207c., Oct. 18	23.25, June 21	19.61, July 6	11.00, June 7	15.00, Nov. 22
1937	2.58414c., Mar. 9	2.32263c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	12.67, June 8	21.92, Mar. 30
1936	2.32263c., Dec. 28	2.06200c., Mar. 10	19.74, Nov. 24	18.73, Aug. 11	12.67, June 9	17.75, Dec. 21
1935	2.07642c., Oct. 1	2.06492c., Jan. 8	18.84, Nov. 5	17.83, May 14	10.33, Apr. 29	13.42, Dec. 10
1934	2.15367c., Apr. 24	1.95757c., Jan. 2	17.90, May 1	16.90, Jan. 27	9.50, Sept. 25	13.00, Mar. 13
1933	1.95578c., Oct. 3	1.75836c., May 2	16.90, Dec. 5	13.56, Jan. 3	6.75, Jan. 3	12.25, Aug. 8
1932	1.89196c., July 5	1.83901c., Mar. 1	14.81, Jan. 5	13.56, Dec. 6	6.43, July 5	8.50, Jan. 12
1931	1.99626c., Jan. 13	1.86586c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	8.50, Dec. 29	11.33, Jan. 6
1930	2.25488c., Jan. 7	1.97319c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	11.25, Dec. 9	15.00, Feb. 18
1929	2.31773c., May 28	2.26498c., Oct. 29	18.71, May 14	18.21, Dec. 17	14.08, Dec. 3	17.58, Jan. 29

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 per cent of the United States output. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

Prices of Finished Iron and Steel . . .

Steel prices shown here are f.o.b. basing points, in cents per lb., unless otherwise indicated. Extras apply. Delivered prices do not reflect 3% tax on freight. (1) Mill run sheet, 0.10¢ per lb. under base; primes 0.25¢ above base. (2) Unassorted 8-lb. coating. (3) Widths up to 12-in. (4) 0.25 carbon and less. (5) Applies to certain width and length limitations. (6) For merchant trade. (7) For straight length material only from producer to consumer. Discount of 25¢ per 100 lb. to fabricators. (8) Also shafting. For quantities of 20,000 to 29,999 lb. (9) Carload lot in manufacturing trade. (10) Prices do not apply if rail and water is not used. (12) Boxed. (13) Portland and Seattle price, San Francisco 2.50¢. (14) This base price for annealed, bright finish wires, commercial spring wire.

Basing Point → / Product ↓	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars	Pacific Ports, Cars[10]	DELIVERED TO Detroit	New York	Philadelphia
Hot Rolled Sheets	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢	2.30¢	2.20¢		2.75¢	2.30¢	2.44¢	2.37¢
Cold Rolled Sheets[1]	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.15¢	3.39¢	3.37¢
Galvanized Sheets (24 gage)	3.65¢	3.65¢	3.65¢		3.65¢	3.65¢	3.65¢	3.65¢	3.75¢	3.65¢		4.20¢		3.89¢	3.82¢
Enameling Sheets (20 gage)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.45¢	3.71¢	3.67¢
Long Ternes[3]	3.80¢	3.80¢	3.80¢									4.55¢		4.16¢	4.12¢
Hot Rolled Strip[2]	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.20¢	2.46¢	
Cold Rolled Strip[4]	2.80¢	2.90¢		2.80¢			2.80¢	(Worcester=3.00¢)					2.90¢	3.16¢	
Cooperage Stock Strip	2.20¢	2.20¢			2.20¢		2.20¢							2.56¢	
Commodity C-R Strip	2.95¢	3.05¢		2.95¢			2.95¢	(Worcester=3.35¢)					3.05¢	3.31¢	
Coke Tin Plate, Base Box	$5.00	$5.00	$5.00						$5.10					5.36¢	5.32¢
.25 / .50 / .75 } Electro Tin Plate, Box	$4.35 / $4.50 / $4.65	$4.35 / $4.50	$4.35 / $4.50 / $4.65						$4.60 / $4.75						
Black Plate (29 gage)[5]	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢[12]			3.37¢
Mfg. Ternes, Special Box	$4.30	$4.30	$4.30						$4.40						
Carbon Steel Bars	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢		(Duluth=2.25¢)			2.50¢	2.80¢	2.25¢	2.49¢	2.47¢
Rail Steel Bars[6]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢					2.50¢	2.80¢			
Reinforcing (Billet) Bars[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢	2.55¢[12]	2.25¢	2.39¢	
Reinforcing (Rail) Bars[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢				2.50¢	c2.55¢[12]	2.25¢		2.47¢
Cold Finished Bars[8]	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢		(Detroit=2.70¢)			(Toledo=2.80¢)			2.99¢	2.97¢
Alloy Bars, Hot Rolled	2.70¢	2.70¢				2.70¢	(Bethlehem, Massillon, Canton=2.70¢)						2.80¢		
Alloy Bars, Cold Drawn	3.35¢	3.35¢	3.35¢	3.35¢		3.35¢							3.45¢		
Carbon Steel Plates	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢		2.20¢	(Coatesville and Claymont=2.20¢) 2.20¢	2.45¢		2.55¢	2.75¢	2.42¢	2.39¢	2.25¢
Floor Plates	3.35¢	3.35¢									3.70¢	4.00¢		3.71¢	3.67¢
Alloy Plates	3.50¢	3.50¢			(Coatesville=3.50¢)						3.95¢	4.15¢		3.70¢	3.50¢
Structural Shapes	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	(Bethlehem=2.10¢)				2.45¢	2.75¢		2.27¢	2.215¢
SPRING STEEL, C-R 0.26 to 0.50 Carbon	2.80¢			2.80¢			(Worcester=3.00¢)								
0.51 to 0.75 Carbon	4.30¢			4.30¢			(Worcester=4.50¢)								
0.76 to 1.00 Carbon	6.15¢			6.15¢			(Worcester=6.35¢)								
1.01 to 1.25 Carbon	8.35¢			8.35¢			(Worcester=8.55¢)								
Bright Wire[14]	2.60¢	2.60¢		2.60¢	2.60¢		(Worcester=2.70¢)		(Duluth=2.65¢)			3.10¢			2.92¢
Galvanized Wire	Add proper size extra and galvanizing extra to Bright Wire base.														
Spring (High Carbon)	3.20¢	3.20¢		3.20¢			(Worcester=3.30¢)					3.70¢			3.52¢
Steel Sheet Piling	2.40¢	2.40¢				2.40¢						2.95¢			2.72¢

EXCEPTIONS TO PRICE SCHED. NO. 6

Slabs—Andrews Steel Co. $41 basing pts.; Wheeling Steel Corp. (rerolling) 4 in. sq. or larger $37.75 f.o.b. Portsmouth, Ohio; Empire Sheet & Tin Plate Corp. $41; Phoenix Iron Co. (rerolling) $41, (forging) $47; Granite City Steel $47.50.

Blooms—Phoenix Iron Co. (rerolling) $41, (forging) $47; Pgh. Steel Co. (reroll) $38.25, (forging) $44.25. Wheeling Steel Corp. (rerolling) 4 in. sq. or larger $37.75 f.o.b. Portsmouth.

Sheet bar—Empire Sheet & Tin Plate Co. $39 mill; Wheeling Steel Corp. $38 Portsmouth, Ohio.

Billets, Forging—Andrews Steel Co. $50 basing pts.; Follansbee Steel Corp. $49.50 Toronto; Phoenix Iron Co. $47.00 mill. Geneva Steel Co. $64.64 f.o.b. Pacific Coast; Pittsburgh Steel Co. $49.50.

Billets, Rerolling—Continental Steel Corp. may charge Acme Steel in Chicago switching area $34 plus freight from Kokomo, Ind.; Northwestern Steel & Wire Co. (Lend-Lease) $41 mill; Wheeling Steel Corp. 4 in. sq. or larger $37.75, smaller $39.50 f.o.b. Portsmouth, Ohio; Stanley Works may sell Washburn Wire Co. under allocation at $39 Bridgeport, Conn.; Keystone Steel & Wire Co. may sell Acme Steel Co. at Chicago base, f.o.b. Peoria; Phoenix Iron Co. $41 mill; Continental Steel Corp. (1¾ x 1¾) $39.50, (2 x 2 $40.60 Kokomo, Ind. (these prices include $1 size extra); Keystone Steel & Wire Co. $36.40 Peoria; Connors Steel Co. $50.60 Birmingham; Ford Motor Co. $34 Dearborn, Mich. Geneva Steel Co. $58.64 f.o.b. Pac. C. Pgt. Steel Co. $43.50.

Structural Shapes—Phoenix Iron Co. $2.35 basing pts. (export) $2.50 Phoenixville; Knoxville Iron Co. $2.30 basing points.

Rails—Sweet Steel Co. (rail steel) $50 mill; West Virginia Rail Co. (lightweight) on allocation based Huntington, W. Va.; Colorado Fuel & Iron Corp., $45 Pueblo.

Hot Rolled Plate—Granite City Steel Co. $2.65 mill; Knoxville Iron Co. $2.25 basing pts.; Kaiser Co. and Geneva Steel Co. $3.20 Pacific Ports; Central Iron and Steel Co. $2.50 basing points; Granite City Steel Co. $2.35 Granite City.

Merchant Bars—W. Ames Co., 10 tons and over, $2.85 mill; Eckels-Nye Steel Corp., $2.50 basing pts. (rail steel) $2.40; Phoenix Iron Co. $2.40 basing pts.; Sweet Steel Co. (rail steel) $2.35 mill; Joslyn Mfg. & Supply Co., $2.35 Chicago; Calumet Steel Div., Borg Warner Corp. (8 in. mill bar) $2.35 Chicago; Knoxville Iron Co. $2.30 basing pts. Laclede Steel Co., sales to LaSalle Steel granted Chicago base, f.o.b. Madison, Ill. Milton Mfg. Co. $2.75 f.o.b. Milton, Pa.

Pipe Skelp—Wheeling Steel Corp., Benwood, $2.05 per cwt.

Reinforcing Bars—W. Ames & Co., 10 tons and over, $2.85 mill; Sweet Steel Co. (rail steel) $2.35 mill; Columbia Steel Co. $2.50 Pacific Ports.

Cold Finished Bars—Keystone Drawn Steel Co. on allocation, Pittsburgh c.f. base plus c/l freight on hot rolled bars Pittsburgh to Spring City, Pa.; New England Drawn Steel Co. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to Mansfield, Mass., f.o.b. Mansfield; Empire Finished Steel Corp. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to plants f.o.b. plant; Compressed Steel Shafting Co. on allocation outside New England, Buffalo base plus c/l freight Buffalo to Readville, Mass. f.o.b. Readville; Medart Co. in certain areas, Chicago c.f. base plus c/l freight Chicago to St. Louis, f.o.b. St. Louis.

Alloy Bars—Texas Steel Co. for delivery except Texas and Okla. Chicago, base, f.o.b. Fort Worth, Tex.; Conors Steel Co. shipped outside Ala., Mississippi, Louisiana, Georgia, Florida, Tenn., Pittsburgh base, f.o.b. Birmingham.

Hot Rolled Strip—Joslyn Mfg. & Supply Co. $2.30 Chicago; Knoxville Iron Co. $2.25 basing pts.

Hot Rolled Sheets—Andrews Steel Co., Middletown base on shipments to Detroit or area; Parkersburg Iron & Steel Co., $2.25 Parkersburg.

Galvanized Sheets—Andrews Steel Co. $3.75 basing pts.; Parkersburg Iron & Steel Co. $3.85 Parkersburg; Continental Steel Co., Middletown base on Kokomo, Ind., product; Superior Sheet Steel Co., Pittsburgh base except for Lend-Lease.

Pipe and Tubing—South Chester Tube Co. when priced at Pittsburgh, freight to Gulf Coast and Pacific Ports may be charged from Chester, Pa., also to points lying west of Harrisburg, Pa.

Black Sheets—Empire Sheet and Tinplate Co., maximum base price mill is $2.45 per 100 lb., with differentials, transportation charges, etc., provided in RPS. No. 6.

WAREHOUSE PRICES

Delivered metropolitan areas per 100 lb. These are zoned warehouse prices in conformance with latest zoning amendment to OPA Price Schedule 49.

Cities	SHEETS			STRIP		Plates ¼ in. and heavier	Structural Shapes	BARS		ALLOY BARS			
	Hot Rolled (10 gage)	Cold Rolled	Galvanized (24 gage)	Hot Rolled	Cold Rolled			Hot Rolled	Cold Finished	Hot Rolled, NE 8617-20	Hot Rolled, NE 9442-45 Ann.	Cold Drawn, NE 8617-20	Cold Drawn, NE 9442-45 Ann.
**Philadelphia	3.518	4.872[8]	5.018a	3.922	4.772	3.605	3.666	3.822	4.072	5.966	7.066	7.272	8.322
New York	3.590	4.613[3]	5.010	3.974[6]	4.772	3.768	3.758	3.853	4.103	6.008	7.108	7.303	8.353
Boston	3.744	4.744[9]	5.224[9]	4.108	4.715	3.912	3.912	4.044	4.144	6.162	7.262	7.344	8.394
Baltimore	3.394	4.852	4.894	3.902	4.752	3.594	3.759	3.802	4.052	....	....	....	....
Norfolk	3.771	4.965	5.371	4.165	4.865	3.971	4.002	4.065	4.165	....	....	....	....
Chicago	3.25	4.20	5.231	3.60	4.65[17]	3.55	3.55	3.50	3.75	5.75	6.85	6.85	7.90
Milwaukee	3.387	4.337[3]	5.272[4]	3.737	4.787[17]	3.687	3.687	3.637	3.887	5.987	7.087	7.087	8.137
Cleveland	3.35	4.40	4.877[4]	3.60	4.45	3.40	3.588	3.35	3.75	5.956	7.056	6.85	7.90
Buffalo	3.35	4.40	4.75[4]	3.819	4.669	3.63	3.40	3.35	3.75	5.75	6.85	6.85	7.90
Detroit	3.45	4.50	5.00[4]	3.70	4.65[917]	3.609	3.661	3.45	3.80	6.08	7.18	7.159	8.209
Cincinnati	3.425	4.475[3]	4.825[5]	3.675	4.711	3.611	3.691	3.611	4.011	....	....	....	....
St. Louis	3.397	4.347[3]	5.172[4]	3.747	4.93[117]	3.697	3.697	3.647	4.031	6.131	7.231	7.231	8.281
Pittsburgh	3.35	4.40	4.75	3.60	4.45	3.40	3.40	3.35	3.75	5.75	6.85	8.85	7.90
St. Paul	3.51	4.48	5.257[4]	3.86	4.35[17]	3.81[13]	3.81[13]	3.76[13]	4.361	6.09	7.19	7.561	8.711
Omaha	3.865	5.443	5.608[4]	4.215	....	4.165	4.165	4.115	4.43	....	....	....	....
Indianapolis	3.58	3.58	4.568	4.918	3.768	4.78	3.63	3.58	3.98	8.08	7.18	7.18	8.23
Birmingham	3.45	....	4.75	3.70	....	3.55	3.55	3.50	4.43	....	....	....	....
Memphis	3.965[7]	4.66	3.265	4.215	....	4.065	4.065	4.015	4.33	....	....	....	....
New Orleans	4.058*	4.95	5.358	4.308	....	4.158	4.158*	4.108*	4.629	....	....	....	....
Houston	3.763	5.573	6.313[1]	4.313	....	4.25	4.25	3.75	6.373[3]	7.223	8.323	8.323	9.373
Los Angeles	5.00	7.20[3]	6.10[4]	4.95	5.61[315]	4.95	4.65	4.40	5.583	8.304	9.404	9.404	10.454
San Francisco	4.55[14]	7.30[4]	6.35[4]	4.50[14]	7.333[17]	4.65[14]	4.35[14]	4.15[14]	5.333	8.304	9.404	9.404	10.454
Seattle	4.65[12]	7.05[4]	5.95[4]	4.25[12]	....	4.75[12]	4.45[12]	4.35[12]	5.783	....	9.404	....	....
Portland	4.65[11]	6.60[4]	5.75[4]	4.75[11]	....	4.75[11]	4.45[11]	4.45[11]	5.533	8.304	9.404	8.304	9.404
Salt Lake City	4.53[17]	....	6.17[18]	5.53[17]	....	4.98[17]	4.98[17]	4.88[17]	5.90	....	....	....	....

MILL EXTRAS FOR NATIONAL EMERGENCY STEELS

Designation	Basic Open-Hearth		Electric Furnace	
	Bars and Bar-Strip	Billets, Blooms, and Slabs	Bars and Bar-Strip	Billets, Blooms, and Slabs
NE 1330	0.10¢	$2.00	....	....
NE 1335	0.10	2.00	....	....
NE 1340	0.10	2.00	....	....
NE 1345	0.10	2.00	....	....
NE 1350	0.10	2.00	....	....
NE 8612	0.65¢	$13.00	$1.15	$23.00
NE 8615	0.65	13.00	1.15	23.00
NE 8617	0.65	13.00	1.15	23.00
NE 8620	0.65	13.00	1.15	23.00
NE 8622	0.65	13.00	1.15	23.00
NE 8625	0.65	13.00	1.15	23.00
NE 8627	0.65	13.00	1.15	23.00
NE 8630	0.65	13.00	1.15	23.00
NE 8632	0.65	13.00	1.15	23.00
NE 8635	0.65	13.00	1.15	23.00
NE 8637	0.65	13.00	1.15	23.00
NE 8640	0.65	13.00	1.15	23.00
NE 8642	0.65	13.00	1.15	23.00
NE 8645	0.65	13.00	1.15	23.00
NE 8647	0.65	13.00	1.15	23.00
NE 8650	0.65	13.00	1.15	23.00
NE 8712	0.70¢	$14.00	$1.20	$24.00
NE 8715	0.70	14.00	1.20	24.00
NE 8717	0.70	14.00	1.20	24.00
NE 8720	0.70	14.00	1.20	24.00
NE 8722	0.70	14.00	1.20	24.00
NE 8725	0.70	14.00	1.20	24.00
NE 8727	0.70	14.00	1.20	24.00
NE 8730	0.70	14.00	1.20	24.00
NE 8732	0.70	14.00	1.20	24.00
NE 8735	0.70	14.00	1.20	24.00
NE 8737	0.70	14.00	1.20	24.00
NE 8740	0.70	14.00	1.20	24.00
NE 8742	0.70	14.00	1.20	24.00
NE 8745	0.70	14.00	1.20	24.00
NE 8747	0.70	14.00	1.20	24.00
NE 8750	0.70	14.00	1.20	24.00
NE 9255	0.40¢	$8.00	....	....
NE 9260	0.40	8.00	....	....
NE 9261	0.65	13.00	....	....
NE 9262	0.65	13.00	....	....
NE 9415	0.75¢	$15.00	$1.25	$25.00
NE 9417	0.75	15.00	1.25	25.00
NE 9420	0.75	15.00	1.25	25.00
NE 9422	0.75	15.00	1.25	25.00
NE 9425	0.75	15.00	1.25	25.00
NE 9427	0.75	15.00	1.25	25.00
NE 9430	0.75	15.00	1.25	25.00
NE 9432	0.75	15.00	1.25	25.00
NE 9435	0.75	15.00	1.25	25.00
NE 9437	0.75	15.00	1.25	25.00
NE 9440	0.75	15.00	1.25	25.00
NE 9442	0.80	16.00	1.30	26.00
NE 9445	0.80	16.00	1.30	26.00
NE 9447	0.80	16.00	1.30	26.00
NE 9450	0.80	16.00	1.30	26.00
NE 9722	0.65¢	$13.00	$1.15	$23.00
NE 9727	0.65	13.00	1.15	23.00
NE 9732	0.65	13.00	1.15	23.00
NE 9737	0.65	13.00	1.15	23.00
NE 9742	0.65	13.00	1.15	23.00
NE 9745	0.65	13.00	1.15	23.00
NE 9747	0.65	13.00	1.15	23.00
NE 9750	0.65	13.00	1.15	23.00
NE 9763	0.65	13.00	1.15	23.00
NE 9768	0.65	13.00	1.15	23.00
NE 9830	$1.30	$26.00	$1.80	$36.00
NE 9832	1.30	26.00	1.80	36.00
NE 9935	1.30	26.00	1.80	36.00
NE 9837	1.30	26.00	1.80	36.00
NE 9840	1.30	26.00	1.80	36.00
NE 9842	1.30	26.00	1.80	36.00
NE 9845	1.30	26.00	1.80	36.00
NE 9847	1.30	26.00	1.80	36.00
NE 9850	1.30	26.00	1.80	36.00
NE 9912	$1.20	$24.00	$1.55	$31.00
NE 9915	1.20	24.00	1.55	31.00
NE 9917	1.20	24.00	1.55	31.00
NE 9920	1.20	24.00	1.55	31.00
NE 9922	1.20	24.00	1.55	31.00
NE 9925	1.20	24.00	1.55	31.00
NE 52100A	....	....	$2.60	$52.00
NE 52100B	....	....	2.60	52.00
NE 52100C	....	....	2.60	52.00

Note 1: The ranges shown are restricted to sizes 100 sq. in. or less or equivalent cross-sectional area 18 in. wide or under, with a maximum individual piece weight of 7000 lb. irrespective of size. **Note 2:** For steels ordered to such ranges, below the size and weight restriction, the average of all the chemical checks must be within the limits specified subject to check analysis variations given in Table 4, Section 10, A.I.S.I. Steel Products Manual. **Note 3:** When acid open-hearth is specified and acceptable, add to basic open-hearth alloy differential 0.25c. per lb. for bars and bar strip and $5 per gross ton for billets, blooms and slabs. **Note 4:** The extras shown are in addition to the base price of $2.70 for 100 lb. on finished products and $54 per gross ton on semi-finished steel, major basing points, and are in cents per pound when applicable to bars and bar-strip and in dollars per gross ton when applicable to billets, blooms and slabs. The full extra applicable over the base price is the total of all extras indicated by the specific requirements of the order. The higher extra shall be charged for any size falling between two published extras.

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD ROLLED: Sheets, 400 to 1499 lb.; strip, extras on all quantities; bars, 1500 lb. base; NE alloy bars, 1000 to 39,999 lb.

EXCEPTIONS: (1) 150 to 499 lb. (2) 150 to 1499 lb. (3) 400 to 1499 lb. (4) 450 to 1499 lb. (5) 500 to 1499 lb. (6) 0 to 1999 lb. (7) 400 to 1999 lb. (8) 1000 to 1999 lb. (9) 450 to 3749 lb. (10) 400 to 3999 lb. (11) 300 to 4999 lb. (12) 300 to 10,000 lb. (13) 400 to 14,999 lb. (14) 400 lb. and over. (15) 1000 lb. and over. (16) 1500 lb. and over. (17) 2000 lb. and over. (18) 3500 lb. and over.

(a) Philadelphia: Galvanized sheet, 25 or more bundles.

Extra for size, quality, etc., apply on above quotations.

*Add 0.271c. for sizes not rolled in Birmingham.

**City of Philadelphia only. Applicable freight rates must be added to basing point prices to obtain delivered price to other localities in metropolitan area.

LAKE SUPERIOR ORES

(51.50% *Fe, Natural Content, Delivered Lower Lake Ports**)

	Per Gross Ton
Old range, bessemer, 51.50	$4.75
Old range, non-bessemer, 51.50	4.60
Mesaba, bessemer, 51.50	4.60
Mesaba, non-bessemer, 51.50	4.45
High phosphorus, 51.50	4.35

*Adjustments are made to indicate prices based on variance of Fe content of ores as analyzed on a dry basis by independent laboratories.

FLUORSPAR

Maximum price f.o.b. consumer's plant, $30 per short ton plus either (1) rail freight from producer to consumer, or (2) rail freight from Rosiclare, Ill., to consumer, whichever is lower.

Exception

When the WPB Steel Division certifies in writing the consumer's need for one of the higher grades of metallurgical fluorspar specified in the table below the price shall be taken from the table plus items (1 and 2) from paragraph above.

Effective CaF_2 Content:	*Base price per short ton*
70% or more	$33.00
65% but less than 70%	32.00
60% but less than 65%	31.00
Less than 60%	30.00

SEMI-FINISHED STEEL

Ingots, Carbon, Rerolling

Base per gross ton, f.o.b. mill $31.00

Exceptions: Phoenix Iron Co. may charge $38.75; Kaiser Co., $43.00 f.o.b. Pacific Coast ports; Empire Sheet & Tinplate Co., $34.25; Pgh. Steel Co., $33.10.

Ingots, Carbon, Forging

Base per gross ton, f.o.b. Birmingham, Buffalo, Chicago, Cleveland, Gary, Pittsburgh, Youngstown $36.00

Exceptions: Phoenix Iron Co. may charge $43.00; Empire Sheet & Tinplate Co., $39.25, f.o.b. Mansfield, Ohio; West Coast producers, $48.00, f.o.b. Pacific Coast Ports; Pgh. Steel Co., $38.10.

Ingots, Alloy

Base per gross ton, f.o.b. Bethlehem, Buffalo, Canton, Coatesville, Chicago, Massillon, Pittsburgh $45.00

Exceptions: C/L delivered Detroit add 2.00; delivered East Michigan add 3.00. Connors Steel Co may charge 45.00 f.o.b. Birmingham.

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (rerolling only). Prices delivered Detroit are $2.00 higher; delivered E. Michigan, $3 higher; f.o.b. Duluth, billets only, $2.00 higher; billets f.o.b. Pacific ports are $12 higher. Provo, $11.20 higher. Delivered prices do not reflect three per cent tax on freight rates.

Per Gross Ton

Rerolling $34.00
Forging quality 40.00

For exceptions on semi-finished steel see the footnote on the page of finished steel prices.

Alloy Billets, Blooms, Slabs

Pittsburgh, Chicago, Canton, Massillon, Buffalo or Bethlehem, per gross ton $54.00

Price delivered Detroit $2.00 higher; E. Michigan, $3.00 higher.

Shell Steel

Per Gross Ton

3 in. to 12 in. $52.00
2 in. to 18 in. 54.00
8 in. and over 56.00

Basic open hearth shell steel, f.o.b. Pittsburgh, Chicago, Buffalo, Gary, Cleveland, Youngstown and Birmingham.

Prices delivered Detroit are $2.00 higher; E. Michigan, $3 higher.

Price Exception: Follansbee Steel Corp. permitted to sell at $13.00 per gross ton, f.o.b. Toronto, Ohio, above base price of $2.00.

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting, or quantity.

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point.

Per Gross Ton

Open hearth or bessemer $34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

Per Lb.

Grooved, universal and sheared .. 1.90c.

Wire Rods

(*No. 5 to 9/32 in.*)

Per Lb.

Pittsburgh, Chicago, Cleveland ... 2.00c.
Worcester, Mass. ..... 2.10c.
Birmingham ..... 2.00c.
San Francisco ..... 2.50c.
Galveston ..... 2.25c.

9/32 in. to 47/64 in., 0.15c. a. lb. higher. Quantity extras apply.

TOOL STEEL

(*F.o.b. Pittsburgh, Bethlehem, Syracuse*)

Base per lb.

High speed ..... 67c.
Straight molybdenum ..... 54c.
Tungsten-molybdenum ..... 57½c.
High-carbon-chromium ..... 43c.
Oil hardening ..... 24c.
Special carbon ..... 22c.
Extra carbon ..... 18c.
Regular carbon ..... 14c.

Warehouse prices east of Mississippi are 2c. a lb. higher; west of Mississippi 3c. higher.

ERIE BUCKETS

THE COMPLETE LINE

General Purpose
Dredging and Hard Digging
Dragline
Material Handlers
Hook-on Type
Ore Handling
Coal and Coke
4-Rope
Barge Type
Strayer Electric

Write for Data

Above types built in weights and capacities to suit your crane and job requirements.

ERIE STEEL CONSTRUCTION CO.
ERIE, PENNSYLVANIA
Aggre Meters • Buckets • Concrete Plants • Traveling Cranes

BELLEVUE FURNACES

are designed for the job.

In the construction of Bellevue Furnaces, painstaking consideration of the job to be done comes first. Every factor must be evaluated, every condition studied. Only then do Bellevue engineers attempt design and recommendation of furnace type.

The soundness of that policy is being demonstrated in plant after plant. Hundreds of executives in scores of varied companies have proved, to their own satisfaction, the efficiency, speed, high production level and operating economies of Bellevues that were "designed" for the job.

You, too, will find Bellevue experience and facilities a profitable investment for your own furnace needs.

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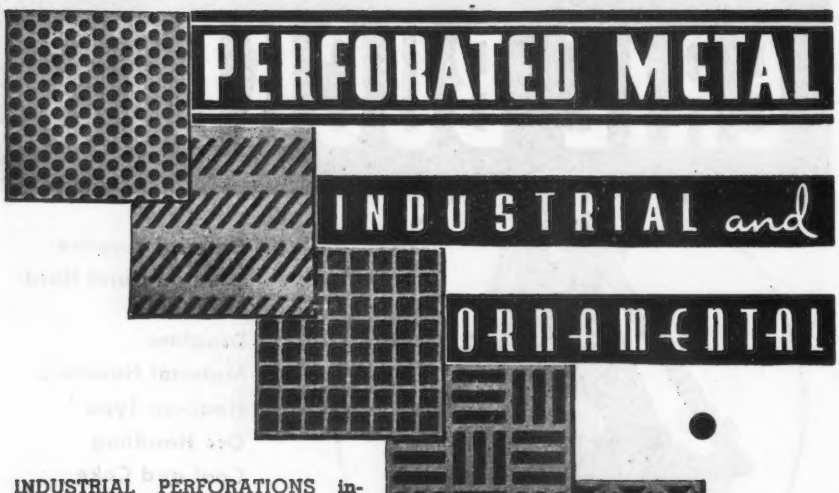
BELLEVUE INDUSTRIAL FURNACE CO.
2974 BELLEVUE AVENUE DETROIT, MICH.

PERFORATED METAL

INDUSTRIAL and ORNAMENTAL



INDUSTRIAL PERFORATIONS include round, square and special shaped perforations as used in mechanical arts. Our line is comprehensive.

ORNAMENTAL PERFORATIONS as used in architectural grilles, metal furniture, enclosures, cabinets, stoves and for ornamentation. Many attractive and exclusive patterns.

H & K workmanship is unsurpassed.

Any Metal
Any Perforation

The Harrington & King PERFORATING Co.

5657 FILLMORE STREET, CHICAGO 44, ILL. Eastern Office: 114 Liberty Street, New York 6, N. Y.

40,000 SHOCKS per DAY

are softened in this FEDERAL CUSHIONED MOVEMENT DIAL INDICATOR

After every other type of shock-protected Dial Indicator had been tried on the job the Federal Cushioned Movement Indicator stood the abuse head and shoulders above the others. They are built to take it. If you have gaging requirements where the Dial Indicator must stand abuse try a Federal Cushioned Movement Indicator. Ask our representative about it, or write to —

FEDERAL PRODUCTS CORPORATION
1144 EDDY STREET PROVIDENCE 1, R. I.

★ ★ ★ ★ ★ FEDERAL ★ ★ ★ ★ ★
PRECISION MEASURING INSTRUMENTS

PRICES

WELDED PIPE AND TUBING

Base Discounts, f.o.b. Pittsburgh Distric and Lorain, Ohio, Mills

(F.o.b. Pittsburgh only on wrought pipe. Base Price—$200.00 per Net Ton

	Black	Galv
Steel (Butt Weld)		
½ in.	63½	51
¾ in.	66½	56
1 to 3 in.	68½	57½
Wrought Iron (Butt Weld)		
½ in.	24	3½
¾ in.	30	10
1 and 1¼ in.	34	16
1½ in.	38	18½
2 in.	37½	18
Steel (Lap Weld)		
2 in.	61	49½
2½ and 3 in.	64	52½
3½ to 6 in.	66	54½
Wrought Iron (Lap Weld)		
2 in.	30½	13
2½ to 3½ in.	31½	14½
4 in.	33½	18
4½ to 8 in.	32½	17
Steel (Butt, extra strong, plain ends)		
½ in.	61½	50½
¾ in.	65½	54½
1 to 3 in.	67	57
Wrought Iron (Same as Above)		
½ in.	25	6
¾ in.	31	12
1 to 2 in.	38	19½
Steel (Lap, extra strong, plain ends)		
2 in.	59	48½
2½ and 3 in.	63	52½
3½ to 6 in.	66½	56
Wrought Iron (Same as Above)		
2 in.	33½	15½
2½ to 4 in.	39	22½
4½ to 6 in.	37½	21

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or $2 a ton higher on all butt weld.

CAST IRON WATER PIPE

	Per Net Ton
6-in. and larger, del'd Chicago	$54.80
6-in. and larger, del'd New York	52.30
6-in. and larger, Birmingham	46.00
6-in. and larger f.o.b. cars, San Francisco or Los Angeles	69.40
6-in. and larger f.o.b. cars, Seattle	71.20

Class "A" and gas pipe, $3 extra; 4-in. pipe is $3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons or over, 6-in. and larger are $45 at Birmingham and $53.80 delivered Chicago, $59.40 at San Francisco and Los Angeles, and $70.20 at Seattle. Delivered prices do not reflect new 3 per cent tax on freight rates.

BOILER TUBES

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes, Minimum Wall. Net base prices per 100 ft. f.o.b. Pittsburgh, in carload lots.

	Seamless Cold Drawn	Seamless Hot Rolled	Lap Weld. Hot Rolled
2 in. o.d. 13 B.W.G.	15.03	13.04	12.23
2½ in. o.d. 12 B.W.G.	20.31	17.54	16.51
3 in. o.d. 12 B.W.G.	22.48	19.50	18.36
3½ in. o.d. 11 B.W.G.	28.37	24.62	23.15
4 in. o.d. 10 B.W.G.	35.20	30.54	28.60

(Extras for less carload quantities)

40,000 lb. or ft., and over	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	20%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft.	65%

WIRE PRODUCTS

the trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham, Duluth

	Basing Points Named	Pacific Coast Basing Points†
	Base per Keg	
andard wire nails....	$2.55	$3.05
ated nails	2.55	3.05
nails, carloads ...	3.85	....
	Base per 100 lb.	
ealed fence wire...	$3.05	$3.55
ealed galv. fence wire	3.40	3.90
	Base Column	
ven wire fence* ...	.67	.85
ce posts, carloads..	.69	.86
gle loop bale ties...	.59	.84
anized barbed wire**	.70	.80
isted barbless wire..	.70	....

*15½ gage and heavier. **On 80-rod ls in carload quantities.
†Prices subject to switching or trans- tation charges.

OLTS, NUTS, RIVETS, SET SCREWS

lts and Nuts
f.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

achine and Carriage Bolts:
Base discount less case lots

	Per Cent Off List
in. & smaller x 6 in. & shorter...	65½
16 & ⅝ in. x 6 in. & shorter.....	63½
to 1 in. x 6 in. shorter.....	61
⅛ in. and larger, all lengths.....	59
l diameters over 6 in. long.....	59
g, all sizes	62
ow bolts	65

uts, Cold Punched or Hot Pressed:
(Hexagon or Square)

⅜ in. and smaller	62
16 to 1 in. inclusive.....	59
⅛ to 1½ in. inclusive.....	57
⅝ in. and larger.....	56

On above bolts and nuts, excepting ow bolts, additional allowance of 10 r cent for full container quantities. here is an additional 5 per cent allow- nce for carload shipments.

Semi-Fin. Hexagon Nuts	U.S.S.	S.A.E.
Base discount less keg lots		
16 in. and smaller.....	..	64
⅜ in. and smaller	62	..
½ in. through 1 in.....	..	60
16 in. through 1 in.....	59	..
⅛ in. through 1½ in.....	57	58
⅝ in. and larger.....	56	..

In full keg lots, 10 per cent additional iscount.

Stove Bolts	*Consumer*
ackages, nuts loose .....71 and	10
n packages, with nuts attached.....	71
n bulk	80

On stove bolts freight allowed up to 5c. per 100 lb. based on Cleveland, Chi- ago, New York on lots of 200 lb. or over.

Large Rivets (½ in. and larger)	*Base per 100 Lb.*
.o.b. Pittsburgh, Cleveland, Chi- cago, Birmingham	$3.75

Small Rivets (7/16 in. and smaller)	*Per Cent Off List*
.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	65 and 5

Cap and Set Screws	*Consumer Per Cent Off List*
Upset full fin. hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in.....	64
Upset set screws, cup and oval points	71
Milled studs	46
Flat head cap screws, listed sizes....	36
Fillister head cap, listed sizes.....	51

Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

ROOFING TERNE PLATE

(F.o.b. Pittsburgh, 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C....	$6.00	$12.00
15-lb. coating I.C....	7.00	14.00
30-lb. coating I.C....	7.50	15.00

Did you Know?

Over 50% of furnace wall radiation losses alone can be stopped? Therm-O-Flake Insulation is preferred for this work in most steel plants.

Here's why!

Highest insulating value — easy to apply — low maintenance — low cost — high reclamation — sticks tightly to silica or basic brick — permits closer control of fuel-air ratios — reduces cold air infiltration.

Write for literature

Illinois Clay Products Company
JOLIET, ILL.

Therm-O-flake
HIGH-TEMPERATURE INSULATION
BRICK - BLOCK - COATINGS - CONCRETE - GRANULES

JOHNSON XLO
Music Wire

Whether to fashion springs or wire forms or any of the innumerable uses of Music Wire, you will find Johnson's XLO Music Wire a readily adaptable product. Note spring on each end of coil. Wire sizes .003" to .200" diameter.

JOHNSON STEEL & WIRE CO., INC.
WORCESTER 1, MASSACHUSETTS
NEW YORK AKRON CHICAGO LOS ANGELES

PIG IRON

All prices set in bold face type are maximum established by OPA on June 24, 1941. Other domestic prices (in italics) are delivered quo per gross ton computed on the basis of the official maximum. Delivered prices do not reflect 3 per cent tax on freight rates.

	No. 2 Foundry	Basic	Bessemer	Malleable	Low Phosphorus	Charcoal
Boston	*$25.50*	*$25.00*	*$26.50*	*$26.00*	.....	.....
Brooklyn	*27.50*	*27.00*	.....	*28.00*	.....	.....
Jersey City	*26.53*	*26.03*	*27.53*	*27.03*	.....	.....
Philadelphia (4)	*25.84*	*25.34*	*26.84*	*26.34*	*$30.74*	.....
Bethlehem	$25.00	$24.50	$26.00	$25.50	.....	.....
Everett, Mass.	25.00	24.50	26.00	25.50	.....	.....
Swedeland, Pa.	25.00	24.50	26.00	25.50	.....	.....
Steelton, Pa.	.....	24.50	.....	.....	$29.50	.....
Birdsboro, Pa. (3)	25.00	24.50	26.00	25.50	29.50	.....
Sparrows Point, Md.	25.00	24.50	.....	.....	.....	.....
Erie, Pa.	24.00	23.50	25.00	24.50	.....	.....
Neville Island, Pa.	24.00	23.50	24.50	24.00	.....	.....
Sharpesville, Pa. (1)	24.00	23.50	24.50	24.00	.....	.....
Buffalo	24.00	23.00	25.00	24.50	29.50	.....
Cincinnati, Ohio	*25.11*	*24.61*	.....	*25.11*	.....	.....
Canton, Ohio	*25.39*	*24.89*	*25.89*	*25.39*	*32.69*	.....
Mansfield, Ohio	*25.94*	*25.44*	*26.44*	*25.94*	*32.86*	.....
St. Louis	*24.50*	*24.50*	.....	.....	.....	.....
Chicago	24.00	23.50	24.50	24.00	*35.46*	..... *$37.34*
Granite City, Ill.	24.00	23.50	24.50	24.00	.....	.....
Cleveland	24.00	23.50	24.50	24.00	*32.42*	.....
Hamilton, Ohio	24.00	23.50	.....	24.00	.....	.....
Toledo	24.00	23.50	24.50	24.00	.....	.....
Youngstown	24.00	23.50	24.50	24.00	*32.42*	.....
Detroit	24.00	23.50	24.50	24.00	.....	.....
Lake Superior fc.	.....	.....	.....	.....	.....	34.00
Lyles, Tenn., fc. (2)	.....	.....	.....	.....	.....	33.00
St. Paul	*26.63*	26.13	*27.10*	*26.63*	*39.80*	.....
Duluth	24.50	24.00	25.00	24.50	.....	.....
Birmingham	20.38	19.00	25.00	.....	.....	.....
Los Angeles	*26.95*	.....	.....	.....	.....	.....
San Francisco	*26.95*	.....	.....	.....	.....	.....
Seattle	*26.95*	.....	.....	.....	.....	.....
Provo, Utah	22.00	21.50	.....	.....	.....	.....
Montreal	*27.50*	*27.50*	.....	*28.00*	.....	.....
Toronto	*25.50*	*25.50*	.....	*26.00*	.....	.....

GRAY FORGE IRON; Valley or Pittsburgh furnace $23.50

(1) Pittsburgh Coke & Iron (Sharpesville, Pa., furnace only) u Struthers Iron & Steel Co., Stru Ohio, may charge 50c. a ton in exc basing point prices for No. 2 fo basic, bessemer and malleable. Str Iron & Steel Co. may add another per gross ton for iron from Stru Ohio, plant.

(2) Price shown is for low-phosp iron; high phosphorus sells for $2 the furnace.

(3) E. & G. Brooke Co., Birdsboro permitted to charge $1.00 per ton

(4) Pittsburgh Ferromanganese (Chester furnace only) may charge a ton over maximum basing point p

Basing point prices are subject switching charges; Silicon differen (not to exceed 50c. a ton for each per cent silicon content in excess of grade which is 1.75 to 2.25 per c Phosphorus differentials, a reductio 38c. per ton for phosphorus conten 0.70 per cent and over; Manganese ferentials, a charge not to exceed per ton for each 0.50 per cent manga content in excess of 1.00 per cent. E tive March 3, 1943, $2 per ton extra be charged for 0.5 to 0.75 per cent ni content and $1 per ton extra for additional 0.25 per cent nickel.

METAL POWDERS

Prices are based on current ma prices of ingots plus a fixed figure. F shipping point, c. per lb., ton lots.

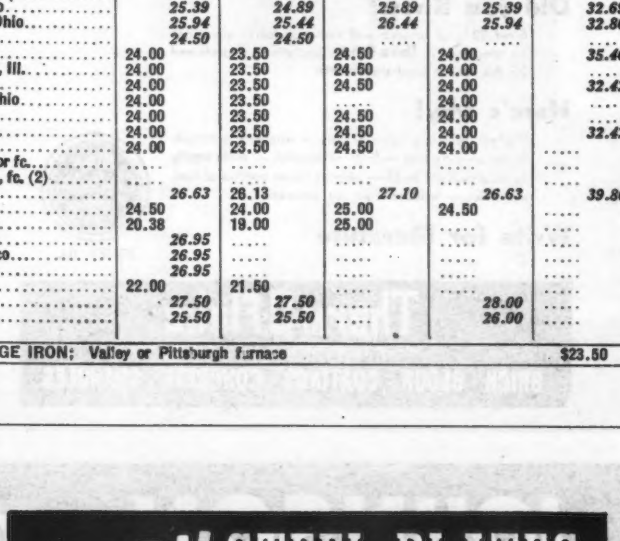
Copper, electrolytic, 150 and 200 mesh ..... 21½ to 2
Copper, reduced, 150 and 200 mesh ..... 20½ to 2
Iron, commercial, 100 and 200 mesh 96 + % Fe ..... 13½ to
Iron, crushed, 200 mesh and finer, 90 + % Fe, carload lots .....
Iron, hydrogen reduced, 300 mesh and finer, 98½ + % Fe, drum lots .....
Iron, electrolytic, unannealed, 300 mesh and coarser, 99 + % Fe 30 to
Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe.....
Iron, carbonyl, 300 mesh and finer, 98-99.8 + % Fe .....
Aluminum, 100 and 200 mesh..*23 to
Antimony, 100 mesh 20
Cadmium, 100 mesh .....
Chromium, 150 mesh $1
Lead, 100, 200 & 300 mesh..11½ to 12
Manganese, 150 mesh .....
Nickel, 150 mesh 51
Solder powder, 100 mesh..8½c. plus me
Tin, 100 mesh 58
Tungsten metal powder, 98%-99%, any quantity, per lb..... $2
Molybdenum powder, 99%, in 200-lb. kegs, f.o.b. York, Pa., per lb. $2
Under 100 lb. $2

*Freight allowed east of Mississippi.

COKE

Furnace, beehive (f.o.b. oven)	Net T
Connellsville, Pa.	$7.0
Foundry, beehive (f.o.b. oven)	
Fayette Co., W. Va.	8.1
Connellsville, Pa.	8.2
Foundry, By-Product	
Chicago, del'd	13.2
Chicago, f.o.b.	12.6
New England, del'd	14.2
Kearny, N. J., f.o.b.	12.6
Philadelphia, del'd	12.8
Buffalo, del'd	13.0
Portsmouth, Ohio, f.o.b.	11.1
Painesville, Ohio, f.o.b.	11.7
Erie, del'd	12.7
Cleveland, del'd	12.8
Cincinnati, del'd	12.8
St. Louis, del'd	13.3
Birmingham, del'd	10.5

*Hand drawn ovens using trucked co permitted to charge $7.75 per ton pl transportation charges.



MARKAL PAINTSTIKS are ideal for layout work on bare or coated metal plates by shipyards, steel mills, steel fabricators, railroads, foundries, etc.

MARKAL PAINTSTIK marks dry instantaneously, permitting immediate handling of plates. Workers can walk on plates without effacing marks.

MARKS COME OFF IN PICKLING BATH OR WITH SOLVENTS

QUICK AND CLEAN—NO MESS, NO FUSS—ALWAYS READY FOR INSTANT USE

Choice of Colors

Write for Samples, Literature

A Specific Type MARKAL PAINTSTIK for Every Marking Job

MARKAL CO. 629 N. Western Ave. Chicago 12, Ill.

"Originators of Paint Sticks"

REFRACTORIES
(F.o.b. Works)

Fire Clay Brick

	Per 1000
Super-duty brick, St. Louis	$64.60
First quality, Pa., Md., Ky., Mo., Ill.	51.30
First quality, New Jersey	56.00
Sec. quality, Pa., Md., Ky., Mo., Ill.	46.55
Sec. quality, New Jersey	51.00
No. 1 Ohio	43.00
Ground fire clay, net ton	7.60

Silica Brick

Pennsylvania and Birmingham	$51.30
Chicago District	58.90
Silica cement, net ton (Eastern)	9.00

Chrome Brick

	Per Net ton
Standard chemically bonded, Balt., Plymouth Meeting, Chester	$54.00

Magnesite Brick

Standard, Balt. and Chester	$76.00
Chemically bonded, Baltimore	65.00

Grain Magnesite

Domestic, f.o.b. Balt. and Chester in sacks (carloads)	$43.48
Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.00

RAILS, TRACK SUPPLIES
(F.o.b. Mill)

Standard rails, heavier than 60 lb., No. 1 O.H., gross ton	$40.00
Angle splice bars, 100 lb.	2.70

(F.o.b. Basing Points)	*Per Gross Ton*
Light rails (from billets)	$40.80
Light rails (from rail steel)	39.00

	Base per Lb.
Cut spikes	3.00c.
Screw spikes	5.15c.
Tie plate, steel	2.15c.
Tie plates, Pacific Coast	2.30c.
Track bolts	4.75c.
Track bolts, heat treated, to railroads	5.00c.
Track bolts, jobbers discount	63-5

Basing points, light rails, Pittsburgh, Chicago, Birmingham; cut spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo. Cut spikes alone—Youngstown, Lebanon, Pa., Richmond, Oregon and Washington ports, add 25c.

CORROSION AND HEAT-RESISTING STEEL
(Per lb. base price, f.o.b. Pittsburgh)

Chromium-Nickel Alloys

	No. 304	No. 302
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.90c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

Straight-Chromium Alloys

	No. 410	No. 430	No. 442	No. 446
F. Billets	15.725c.	16.15c.	19.125c.	23.375c.
Bars	18.50c.	19.00c.	22.50c.	27.50c.
Plates	21.50c.	22.00c.	25.50c.	30.50c.
Sheets	26.50c.	29.00c.	32.50c.	36.50c.
Hot strip	17.00c.	17.50c.	24.00c.	35.00c.
Cold strip	22.00c.	22.50c.	32.00c.	52.00c.

Chromium-Nickel Clad Steel (20%)

	No. 304
Plates	18.00c.*
Sheets	19.00c.

*Includes annealing and pickling.

ELECTRICAL SHEETS
(Base, f.o.b. Pittsburgh)

	Per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.

F.o.b. Granite City, add 10c. per 100 lb. on field grade to and including dynamo. Pacific ports add 75c. per 100 lb. on all grades.

IF THERE IS A FLAW "FLASH-O-LENS" WILL FIND IT!

The new FLASH-O-LENS offers foundry-men, machinists, and many others engaged in producing metal parts for war contracts an efficient, economical means of examining the most minute defects during routine inspections.

FLASH-O-LENS consists of a portable 40x microscope combined with a perfect source of illumination in one convenient, compact unit . . . They are available in several models—powered by either standard flash light dry cells or by current from any AC or DC outlet—and with a selection of various combinations of lenses, all interchangeable in the one lens housing.

Send today for illustrated catalog describing the new FLASH-O-LENS

E. W. PIKE & COMPANY — PIKE

Manufacturers — ELIZABETH, N. J.

FOR ALL TYPES of INDUSTRIAL FURNACES

The Choice of Many Steel Mills

P-811 — Type SA—Model G Fuel Oil Burner

for firing Yard Locomotives, Cranes, Hoists, etc.

This fuel oil burner has all the outstanding features that have made our standard Type SA burner (shown below) preferred for a wide variety of uses for 33 years.

The Locomotive Oil Burner works on a low head, gravity oil feed . . . gives complete atomization of cheapest grades of oil and tar with low steam consumption . . . requires little maintenance. For more details write us.

NATIONAL AIROIL FUEL OIL - GAS BURNERS

Steam Atomizing Oil Burners—Mechanical Pressure Atomizing Oil Burners—Low Air Pressure Oil Burners—Motor-driven Rotary Oil Burners—Industrial Gas Burners—Combination Gas and Oil Burners—Fuel Oil Pumping Units—Fuel Oil Heaters—Fuel Oil Strainers and other accessories.

Cross Section of Type SA Oil Burner

NATIONAL AIROIL BURNER COMPANY, INCORPORATED

1271 East Sedgley Ave., Philadelphia 34, Pa.

ESTABLISHED 1912 — INCORPORATED 1917

OPERATES SO QUIETLY

The unusually quiet operation of Reading Electric Hoists is due to the use of worm gear speed reduction.

Quiet operation also means less wear of moving parts and therefore a minimum of maintenance. Low cost maintenance also results because there are only three moving parts of the hoisting mechanism proper. High precision anti-friction bearings are another factor in the smooth, quiet operation of Reading Electric Hoists.

It will pay you to investigate the money saving features of Reading Electric Hoists. For full technical information, write for Bulletin 1004.

READING CHAIN & BLOCK CORPORATION
401 ADAMS ST., READING, PA.

CHAIN HOISTS • ELECTRIC HOISTS • OVERHEAD TRAVELING CRANES

READING HOISTS

Here's a space, time and cost saver

RANSOHOFF ROTOMATIC CLEANING MACHINE

wash, rinse, dry

AN every day testimonial to the fact that "to economize you must modernize." ROTOMATIC occupies space only 8'6" x 8' 6". Equipped with RANSOHOFF PACKLESS PUMPS. Obtainable for handling work in any of these four ways:

(1) Hang work on fixtures. (2) Clean work in a series of rotating baskets loaded and unloaded automatically. (3) Put work in removable baskets and place on revolving table. (4) Large work on table.

All bearings and driving mechanism are mounted on top of machine and do not come into contact with cleaning solution.

N. Ransohoff, Inc.

1315 TOWNSHIP AVE. • CINCINNATI 16, OHIO

Ferromanganese

78-82% Mn, maximum contract price per gross ton, lump size, f.o.b. at Baltimore, Bethlehem, Philadelphia, New York, Birmingham, Rockdale, Ill., Sheffield, Tenn.

Carload lots (bulk) $115
Carload lots (packed) ..... 1[illegible]
Less ton lots (packed) ..... 1[illegible]

$1.70 for each 1% above 82% max. penalty, $1.70 for each 1% below 7[illegible]

Manganese Metal

Contract basis, lump size, per lb. of metal, f.o.b. shipping point with freight allowed. Spot sales add 2c. per lb.

96-98% Mn, .2% max. C, 1% max. Si, 2% max. Fe.
Carload, bulk .....
L.c.l. lots .....

95-97% Mn, .2% max. C, 1.5% max. Si, 2.5% max. Fe.
Carload, bulk .....
L.c.l. lots .....

Spiegeleisen

Maximum base, contract prices, per gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Carloads	$35.00	$36.00
Less ton	47.50	49.50

Electric Ferrosilicon

OPA maximum base price cents per lb. of contained Si, lump size in carlots, f.o.b. shipping point with freight allowed.

	Eastern Zone	Central Zone	Western Zone
50% Si ...	6.65c.	7.10c.	7.[illegible]
75% Si ...	8.05c.	8.30c.	8.[illegible]
80-90% Si..	8.90c.	9.05c.	9.[illegible]
90-95% Si..	11.05c.	11.30c.	11.[illegible]

Spot sales add: 45c. per lb. for 50% Si, .3c. per lb. for 75% Si, .25c. per lb. for 80-90% and 90-95% Si.

Silvery Iron

(C/L, Per Gross Ton, base 6.00 to 6.50 Si

F.o.b. Jackson, Ohio ..... $29.[illegible]
Buffalo ..... 30.[illegible]

For each additional 0.50% silicon add $1 a ton. For each 0.50% manganese over 1% add 50c. a ton. Add $1 a ton for 0.75% phosphorous or over.

*OPA price established 6-24-41.

Bessemer Ferrosilicon

Prices are $1 a ton above silvery iron quotations of comparable analysis.

Silicon Metal

OPA maximum base price per lb. of contained Si, lump size, f.o.b. shipping point with freight allowed to destination for l.c.l. above 2000 lb., packed. Add .25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
96% Si, 2% Fe.	13.10c.	13.55c.	16.[illegible]c.
97% Si, 1% Fe.	13.45c.	13.90c.	16.[illegible]c.

Ferrosilicon Briquets

OPA maximum base price per lb. of briquet, bulk, f.o.b. shipping point with freight allowed to destination. Approximately 40% Si. Add .25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
Carload, bulk.	3.35c.	3.50c.	3.65c.
2000 lb.-carload	3.8c.	4.2c.	4.25c.

Silicomanganese

Contract basis lump size, per lb. of metal, f.o.b. shipping point with freight allowed. Add .25c. for spot sales. 65-70% Mn, 17-20% Si, 1.5% max. C.

Carload, bulk ..... 6.05c.
2000 lb. to carload ..... 6.70c.
Under 2000 lb. ..... 6.90c.
Briquets, contract, basis carlots, bulk freight allowed, per lb. ... 5.30c.
2000 lb. to carload ..... 6.20c.
Less ton lots ..... 6.55c.

Ferrochrome

(65-72% Cr, 2% max. Si)

OPA maximum base contract prices per lb. of contained Cr, lump size in carload lots, f.o.b. shipping point, freight allowed to destination. Add .25c. per lb. contained Cr for spot sales.

	Eastern Zone	Central Zone	Western Zone
0.06% C	23.00c.	23.40c.	24.00c.
0.10% C	22.50c.	22.90c.	23.50c.
0.15% C	22.00c.	22.40c.	23.00c.
0.20% C	21.50c.	21.90c.	22.50c.
0.50% C	21.00c.	21.40c.	22.00c.
1.00% C	20.50c.	20.90c.	21.50c.
2.00% C	19.50c.	19.90c.	21.00c.
66-71% Cr, 4-10% C	13.00c.	13.40c.	14.00c.
62-66% Cr, 5-7% C	13.50c.	13.90c.	14.50c.

...Nitrogen Ferrochrome

...w-carbon type: 67-72% Cr, 0.75% ...dd 2c. per lb. to regular low-carbon ...chrome price schedule. Add 2c. for ... additional 0.25% N. High-carbon ...: 66-71% Cr, 4-5% C, 0.75% N. Add ...er lb. to regular high-carbon ferro... ...me price schedule.

...Carbon Ferromanganese

...ntract prices per lb. of manganese ...ained, lump size, f.o.b. shipping point, ...ht allowed to destination, Eastern ... Add 0.25c. for spot sales.

	Carloads, Bulk	Ton Lots	Less Ton
...% max. C, 1 ...2% max. Si	23.00c.	23.40c.	23.65c.
...% max. C, 1 ...2% max. Si	22.00c.	22.40c.	22.65c.
...% max. C, 1 ...2% max. Si	21.00c.	21.40c.	21.65c.
...% max. C, 1 ...2% max. Si	20.00c.	20.40c.	20.65c.
...% max. C, ...00% max. Si	16.00c.	16.40c.	16.65c.

...rochrome Briquets

...Contract prices per lb. of briquet, f.o.b. ...pping point, freight allowed to destina... ... Approx. 60 per cent contained ...omium. Add 0.25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
...load, bulk..	8.25c.	8.55c.	8.95c.
...n lots	8.75c.	9.35c.	10.75c.
...ss ton lots...	9.00c.	9.50c.	11.00c.

...romanganese Briquets

...Contract prices per lb. of briquet, f.o.b. ...pping point, freight allowed to destina... ...n. Approx. 66 per cent contained man...nese. Add 0.25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
...load, bulk .	6.05c.	6.30c.	6.60c.
...n lots	6.55c.	7.55c.	8.55c.
...ss ton lots ..	6.80c.	7.80c.	8.80c.

...lcium—Manganese—Silicon

...Contract prices per lb. of alloy, lump ...e, f.o.b. shipping point, freight allowed ... destination.

16-20% Ca, 14-18% Mn, 53-59% Si. ...dd 0.25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
...arloads	15.50c.	16.00c.	18.05c.
...n lots	16.50c.	17.35c.	19.10c.
...ess ton lots..	17.00c.	17.85c.	19.60c.

...lcium Metal

...Eastern zone contract prices per lb. of ...etal, f.o.b. shipping point, freight al...wed to destination. Add 5c. for spot ...les. Add 0.9c. for Central Zone; 0.49c. ...r Western Zone.

	Cast	Turnings	Distilled
...n lots	$1.80	$2.30	$5.00
...ess ton lots..	2.30	2.80	5.75

...hromium—Copper

...Contract price per lb. of alloy, f.o.b. ...iagara Falls, freight allowed east of ...e Mississippi River. 8-11% Cr, 88-90% ...u, 1.00% max. Fe, 0.50% max. Si. Add ...c. for spot sales.

...hot or ingot ..... 45c.

...erroboron

...Contract prices per lb. of alloy, f.o.b. ...hipping point, freight allowed to destina...tion. Add 5c. for spot sales. 17.50% ...in. B, 1.50% max. Si, 0.50% max. Al, ...50% max. C.

	Eastern Zone	Central Zone	Western Zone
...Ton lots	$1.20	$1.3075	$1.329
...Less ton lots	1.30	1.3075	1.329

...Manganese—Boron

...Contract prices per lb. of alloy, f.o.b. ...hipping point, freight charges allowed. ...Add 5c. for spot sales.

...75.00% Mn, 15-20% B, 5% max. Fe, ...1.50% max. Si, 3.00% max. C.

	Eastern Zone	Central Zone	Western Zone
...Ton lots ...	$1.89	$1.903	$1.935
...Less ton lots	2.01	2.023	2.055

...Nickel—Boron

...Spot and contract prices per lb. of al...loy, f.o.b. shipping point, freight allowed ...to destination.

...15-18% B, 1.00% max. Al, 1.50% max. ...Si, 0.50% max. C, 3.00% max. Fe, bal...ance Ni.

	Eastern Zone	Central Zone	Western Zone
...11,200 lb. ...or more ..	$1.90	$1.9125	$1.9445
...Ton lots ..	2.00	2.0125	2.0445
...Less ton lots	2.10	2.1125	2.1445

Other Ferroalloys

Ferrotungsten, Standard grade, lump or ¼X down, packed, f.o.b. plant at Niagara Falls, New York, Washington, Pa., York, Pa., per lb. contained tungsten, 10,000 lb. or more....	$1.90
Ferrovanadium, 35-55%, contract basis, f.o.b. producer's plant, usual freight allowances, per lb. contained Va.	
Open hearth	$2.70
Crucible	$2.80
Primos	$2.90
Cobalt, 97% min., keg packed, contract basis, f.o.b. producer's plant, usual freight allowances, per lb. of cobalt metal.....	$1.50
Vanadium pentoxide, 88%-92% V_2O_5 technical grade, contract basis, any quantity, per lb. contained V_2O_5. Spot sales add 5c. per lb. contained V_2O_5.....	$1.10
Ferroboron, contract basis, 17.50% min., Bo, f.o.b. producer's plant with usual freight allowances, per lb. of alloy.	
2000 lb. to carload.....	$1.20
Under 2000 lb.....	1.30
Silcaz No. 3, contract basis, f.o.b. producer's plant with usual freight allowances, per lb. of alloy. (Pending OPA approval)	
Carload lots	35c.
2000 lb. to carload.....	36c.
Silvaz No. 3, contract basis, f.o.b. producer's plant with freight allowances, per lb. of alloy (Pending OPA approval)	
Carload lots	58c.
2000 lb. to carload.....	59c.
Grainal, f.o.b. Bridgeville, Pa., freight allowed 50 lb. and over, max. based on rate to St. Louis	
No. 1	87.5c.
No. 6	60c.
No. 79	45c.
Bortram, f.o.b. Niagara Falls	
Ton lots, per lb.....	45c.
Less ton lots, per lb.....	50c.
Ferrocolumbium, 50-60%, contract basis, f.o.b. plant with freight allowances, per lb. contained Cb.	
2000 lb. lots.....	$2.25
Under 2000 lb. lots.....	$2.30
Ferrotitanium, 40%-45%, 0.10%C. max. f.o.b. Niagara Falls, N. Y., ton lots, per lb. contained Ti..	$1.23
Less ton lots	$1.35
Ferrotitanium, 20%-25%, 0.10%C. max., ton lots, per lb. contained titanium	$1.35
Less ton lots.....	$1.40
High-carbon ferrotitanium, 15%-20%, 6%-8% carbon, contract basis, f.o.b. Niagara Falls, N. Y., freight allowed East of Mississippi River, North of Baltimore and St. Louis, per carload.....$142.50	
Ferrophosphorus, 18% electric or blast furnaces, f.o.b. Anniston, Ala., carlots, with $3 unitage freight equalled with Rockdale, Tenn., per gross ton.....	$58.50
Ferrophosphorus, electrolytic 23-26%, carlots, f.o.b. Monsanto (Siglo), Tenn., $3 unitage freight equalized with Nashville, per gross ton	$75.00
Ferromolybdenum, 55-75%, f.o.b. Langeloth, Washington, Pa., any quantity, per lb. contained Mo.	95c.
Calcium molybdate, 40%-45%, f.o.b. Langeloth and Washington, Pa., any quantity, per lb. contained Mo.	80c.
Molybdenum oxide briquettes, 48%-52% Mo, f.o.b. Langeloth, Pa., per lb. contained Mo.....	80c.
Molybdenum oxide, in cans, f.o.b. Langeloth and Washington, Pa., per lb. contained Mo.....	80c.
Zirconium, 35-40%, contract basis, f.o.b. producer's plant with freight allowances, per lb. of alloy. Add ¼c. for spot sales	
Carload lots	14c.
Zirconium, 12-15%, contract basis, lump f.o.b. plant usual freight allowances, per lb. of alloy	
Carload, bulk	4.6c.
Alsifer (approx. 20% Al, 40% Si and 40% Fe), contract basis, f.o.b. Niagara Falls, carload, bulk	5.75c.
Ton lots	7.25c.
Simanal (approx. 20% Si, 20% Mn, 20% Al), contract basis, f.o.b. Philo, Ohio, with freight not to exceed St. Louis rate allowed, per lb.	
Car lots	8.75c.
Ton lots	9.25c.

in this hard-faced punch

After this punch was given a protective overlay of Coast Metals Hard-Facing, it was able not only to turn out several thousand more track links before showing signs of wear, but also to do better and cleaner work. Material and labor costs involved in welding the overlay on the punch were more than compensated for by the much longer punch life obtained.

Users of a wide diversity of machines, equipment and products who have enlisted Coast Metals Hard-Facing for making the working surfaces of new or old parts wear-resistant are reporting equally outstanding economies. In one plant it is longer equipment life. In another, fewer shutdowns and less idle labor. In still a third, salvaging and reclaiming worn parts. And so on!

Write for a copy of our new pamphlet "Your Best Protection Against Wear" which goes into full detail.

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hard-facing weld rods
MAKE YOUR EQUIPMENT LAST LONGER

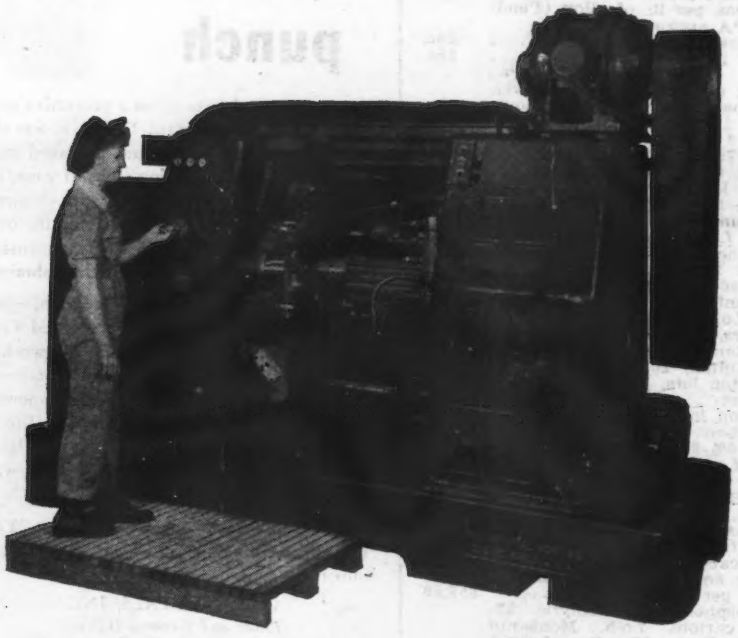
High Standards of Precision
Low Standards of Cost...

Here at National Acme, our main business is helping other manufacturers cut the cost of their products and at the same time raise their standards of precision.

We build Automatic machines that turn out *more* for *less*—machines that produce identical parts by the million—to whatever precision standards the job calls for.

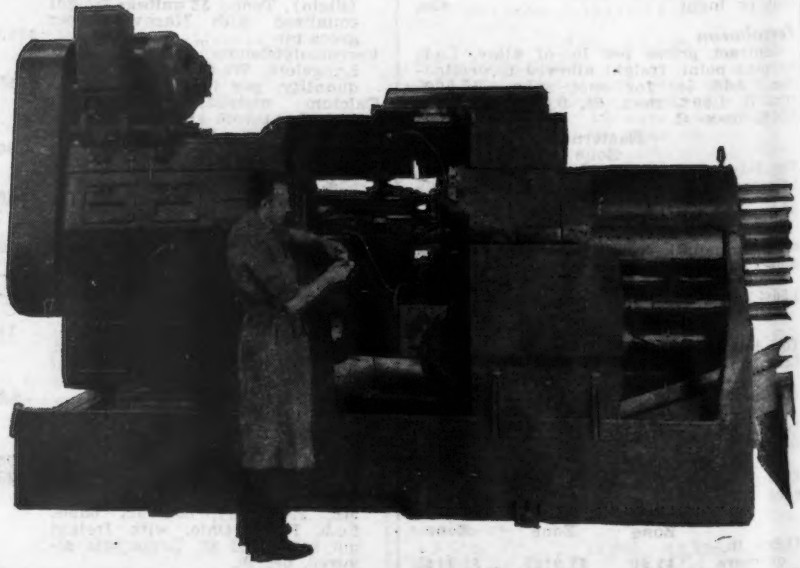
These are the machines upon which industry can depend to build the improved products of the future. And to build them at costs that permit the lower selling prices needed to broaden markets.

You are invited to consult with us on how to increase production of metal parts, or how to cut their cost.



4-6-8
Spindle
ACME-GRIDLEY
Chucking Automatics

This new line of chuckers is built for fast operation and precision work. Chuck capacity up to 12". Easily accessible tooling area speeds setup and permits use of more tools per job—either high-speed steel or carbide-tipped.

4-6-8
Spindle
ACME-GRIDLEY
Bar Automatics

Built to handle bar stock from 9/16" to 7 1/4" diameter. Operate to highest precision standards at speeds and feeds limited only by the endurance of the tools. These machines have no equal for adaptability, for output per hour, or for low cost per piece.